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THE EFFECTS OF ATTENTION CONTROL TRAINING ON PERFORMANCE IN SPECIFIC BASKETBALL GAME SITUATIONS

University — Université

University of Alberta

Degree for which thesis was presented — Grade pour lequel cette thèse fut présentée

M.A.

Year this degree conferred — Année d'obtention de ce grade	Name of Supervisor — Nom du directeur de thèse
1982	DR. R.B. ALDERMAN

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THE EFFECTS OF ATTENTION CONTROL TRAINING ON PERFORMANCE IN SPECIFIC BASKETBALL GAME SITUATIONS

by

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF ARTS

PHYSICAL EDUCATION

EDMONTON, ALBERTA

FALL, 1982

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DEGREE FOR WHICH THESIS WAS PRESENTED MASTER OF ARTS

YEAR THIS DEGREE GRANTED FALL, 1982

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Supervisor

Jane Mathews

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Date August 31, 1982

Abstract

Robert Nideffer(1976a) has proposed an Attention Control Training program aimed to enhance performance. He advocates the use of a relaxation strategy referred to as centering to be supplemented with various other cognitive strategies with the purpose of relaxing the athlete and allowing her to redirect attention to appropriate cues in the competitive environment. His program begins with the athlete writing the Test of Attentional and Interpersonal Style(TAIS). An athlete's TAIS profile summarizes her attentional strengths and weaknesses and hence provides some direction for implementing cognitive strategies.

The major purpose of this study was to investigate the efficacy of employing centering combined with mental rehearsal as part of a basketball training program. Four University of Alberta female intervarsity basketball players were chosen as subjects for the investigation.

A single subject design was employed to measure each player's game performance in six selected game situations. These situations represented either a broad external(BET) or narrow(NAR) focus of attention.

Each subject participated in private sessions for centering and to mentally rehearse the designated situations each week. Sessions were continued prior to each home game series until all of the six situations were intervened upon.

It was hypothesized that the treatment intervention (i.e. centering and mental rehearsal) would enhance the

player's performance in the defined basketball game situations. This hypothesis was rejected as minimal positive results were found. It was also hypothesized that there would be a positive relationship between a player's initial TAIS profile and the intervention effects on the BET and NAR behaviors. The TAIS profile of each subject provided some congruency with the study results. However, this hypothesis was not completely confirmed or rejected. Recommendations in terms of both research and practical implementation of Attention Control Training were then made.

Acknowledgements

I would like to acknowledge my advisor Dr. R.B. Alderman for his guidance throughout my program. A special thanks to Dr. J. Watkinson for her time and effort and Coach Shogan and John Barry for their assistance.

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I. INTRODUCTION

The past decade has seen an unparalleled increase in sport performance standards as evidenced by the large number of record breaking performances in the international sport arena. These new records are more often than not the result of the introduction of sophisticated training techniques. Many of these new approaches to training focus beyond the traditional physiological aspects of training, placing a major emphasis on the psychological parameters of performance. Perhaps one of the more commonly thought of sport activities in which performance is significantly affected by psychological factors is that of running. Reaching the 20th of 26 marathon miles, more commonly known to marathoners as 'hitting the wall', is the psychological breaking point that must be overcome, by the runner. Ryder, Car and Herget (1976) suggest that in pursuing the mile record:

> . . . the barrier to be overcome by the runner who wants to be a champion is psychological: the last record set and the willingness of athletes to try to break it are the determining factors for the next record.

An abundance of books, articles, courses and conferences are introducing mental strategies which aim to enhance performance. This wholistic approach to training and performance recognizes the importance of the total being, both the body and mind, for optimal performance. Research investigations such as the one by Nelson and Furst (1972) further demonstrate the power of the human mind. In their

study, ten out of twelve arm wrestling contests were won by contestants with a lower strength factor who believed they were stronger than their opposition.

Possessing a positive attitude toward winning is only one example of an avenue for the use of mental or cognitive strategies in sport performance. Robert Nideffer (1976a) has identified attention as a cognitive process which can be enhanced by the application of specific cognitive strategies. He refers to the width of an athlete's attentional focus as either broad or narrow. Some situations require a narrow focus which is directed towards selective and limited internal or external cues. An example is a free throw in basketball. Other situations require a broad focus in which the individual focuses on a range of environmental cues. An example of this would be a play developing on the basketball court. The direction of attentional focus, external and internal is also important. An internal focus requires the individual to become aware of intrinsic cues such as cognitive strategies or proprioceptive stimuli. An example would be the athlete who analyzes the opposition's offense or is just being sensitive to how her body is feeling. An external focus is directed towards a range of environmental cues and is needed to react to an opponent or to be able to choose what offensive move to execute in a game. In the competitive situation the athlete is required to shift from a broad to a narrow focus of attention and also from an internal to an external focus and vice versa.

Different situations will necessitate the athlete to predominantly use any one focus of attention, but the demands of the sport will constantly change requiring the athlete to shift from one to another. In a time constrained pressure situation, this may become more difficult. The athlete may experience:

1. A reduced ability to shift from one type of attention to another.

2. A tendency for her attention to involuntarily narrow.

3. A tendency for her attention to become more internally focused. (Nideffer 1979)

An athlete in this situation may be so busy ruminating over past errors that she is unable to see important cues in the environment and hence does not perform effectively. The athlete placed in such a pressure situation could potentially be assisted by specific mental strategies aimed to enhance cognitive processes. Nideffer (1976a) proposes a strategy called 'Attention Control Training' (A.C.T.). He advocates relaxation training, which will allow the athlete to relax in stressful situations and then be able to refocus her attention to task relevant cues. The program requires the athlete to become aware of her attentional strengths and weaknesses and then equips her with appropriate strategies related to maximizing performance.

An A.C.T. program involving relaxation combined with mental rehearsal, was implemented with four University of

Alberta female intervarsity basketball players. The thrust of this investigation was to determine the effects of these strategies on the game performance of each athlete.

Statement of the Problem

The main focus of this study was to investigate the efficacy of employing Nideffer's(1976a) 'Attention Control Training' program using two specific cognitive coping strategies in a basketball training program. Game performance was measured in game situations which were selected as representing either a broad external (BET) or narrow (NAR) focus of attention. Four University of Alberta female intervarsity basketball players were used as subjects. A time series design across behaviors and individuals was employed to measure their game performance in specifically selected situations.

A subproblem of the study was to determine if a relationship existed between a player's initial attentional profile, as measured by Nideffer's 'Test of Attentional and Interpersonal Style' (TAIS), and performance results on the behaviors requiring a BET and NAR focus of attention, after strategy intervention.

Justification for the Study

This study is justified on the following grounds:

1. With the caliber of athletic performance escalating at

such a rapid rate, it is necessary for any serious and legitimate athletic program to go beyond physical training and encompass the psychological dimensions also necessary for optimal performance. This study recognizes the key role that cognitive processes have in human performance, more specifically in the motor performance of intervarsity athletes. It proposes a program that allows integration of the total individual as a dynamic interactive organism aiming to attain successful performance. The physical components of training are complemented with mental strategies, allowing the individual to make use of all her resources, both physical and mental.

2. A great deal of theoretical inference surrounds the use of mental training strategies in athletic programs. Many programs implemented by various coaches and athletes fall short of valid and reliable results demonstrating their efficacy. This study systematically tests, in as ecologically valid an environment as possible, specific cognitive strategies and provides recommendations for their use.

3. Many coaches are limited in terms of time, facilities and personnel that may be at their disposal, and further, are limited in terms of their own knowledge and/or experience in using cognitive coping strategy techniques. An effective and competitive training program today necessitates the inclusion of psychological training methods. Thus, an efficient and simple method to identify the appropriate

strategies and procedures for implementing strategy training techniques should be a valuable asset for coaches. One of the outcomes of this study will be the development of such a training package.

Hypotheses

1. Intervention of centering combined with mental rehearsal will improve the players performance on the behaviors identified as requiring a BET and NAR focus of attention on the basketball court.
2. There will be a positive relationship between a player's initial TAIS profile and the data results after intervention on the BET and NAR behaviors.

Delimitations

1. Due to a time factor in implementing intervention procedures, the study is delimited to four University of Alberta female intervarsity basketball players.
2. The study is delimited to the 1981-82 University of Alberta basketball season home games.
3. The behaviors measured in the study are delimited to broad external and narrow focus of attention. Four of the six attentional behaviors identified by the TAIS: broad internal(BIT), overload external(OET), overload internal(OIT) and reduced focus of attention(RED), are not a part of this study. Three basketball specific situations

representing each behavior will be measured.

4. The contruct validity of the TAIS has been examined by Nideffer (1976b). Some construct validity is apparent in only three of the six attentional scales: broad external(BET), overload internal(OIT) and reduced focus of attention(RED). This study is delimited by these slight findings.

Limitations

1. The study is limited in that subjects may talk to each other about their interventions which could bias the results to the extent that subjects are mentally rehearsing situations that are not being intervened upon.
2. The data collected on each subject will present information and conclusions unique to that player. Generalizations to other players will be limited.
3. The study is limited by each player's ability to relax and develop clear images during mental rehearsal. It is also limited to the extent that each player's centering and mental rehearsal before and during all games cannot be completely monitered.

Definition of Terms

Attention - Attention is conceptualized on two dimensions: width - the amount of information one attends to; direction - the focus is directed internally or externally.

Attentional Style - the attentional strengths and weaknesses of an individual along the attentional dimensions of width and direction.

BET - broad external focus of attention. The ability to identify or detect correct cues out of the many cues which exist.

NAR - narrow focus of attention. The ability to narrow attention and concentrate on one thing.

TAIS - Developed by Robert Nideffer, the Test of Attentional and Interpersonal style.

Cognitive Coping Strategy - A phase of anxiety management developed to aid the athlete in utilizing a relaxation process and then focusing to the immediate task.

Anxiety - refers to the psychological- emotional changes in response to stress.

Stress - refers to an external condition that can cause increases in an athlete's physiological level of arousal.

Centering - a progressive relaxation strategy which allows the athlete to regain attentional control.

II. Review of Literature

Attentional Theories

Robert Nideffer (1976a) has emphasized the importance of attention in performance. The athlete must select and attend to the most relevant cues from the environment and process this information with their own internal knowledge in order to react appropriately in any given situation. How does the selection process occur? Why is it that some people are able to attend to large amounts of information while other athletes are overloaded under similar circumstances and unable to perform effectively? A cursory review of attentional theory may help in answering these questions and provide a backdrop for the introduction of Nideffer's 'Attention Control Training' (A.C.T.) program.

The concept of having to focus one's attention in terms of awareness was first suggested within the Wersburg school(Norman 1969). The more that one was able to focus on the task, the better one was able to perform. However, the processes of attention were not considered.

The first complete theory of attention from a process perspective, was not formulated until 1958, when Donald Broadbent suggested a selective filter theory of attention. Building on the experiments of Cherry who had shown clearly that when two messages are presented simultaneously one will interfere with the other, that is, an individual will attend to only one message at a time, Broadbent attempted to put together a theoretical contruct that would explain the

underlying processes(Norman 1969). He suggested that the human was a limited capacity processer that will select or filter relevant information on the basis of its physical properties. Further, attention may switch back and forth between pieces of information which have been admitted through the filter. Broadbent's model necessitates that the discrimination of information on the basis of relevancy and irrelevancy is made before perception has occurred, that is before the individual has been able to derive meaning from the input source. While the model was basically accepted, the point at which attention became selected did not stand up to further experimentation (Treisman 1964).

Ann Treisman (1964) suggested that input signals were analyzed and selected through a sequence of operations. Following from Broadbent, she suggested, where possible signals were separated from one another by their physical features. However she went on to suggest that a further selection occured on the basis of grammatical features. While Treisman extended Broadbent's model slightly, it necessitated an increase in the complexity of the selective mechanism to interpret grammatical meanings thus violating a fundamental principal of parsimony. Treisman advocated a selection process that takes place before perception, that is, the filter mechanism was preset to filter out messages not conforming to a specified criterion determined on both a physical and grammatical basis.

Deutsch and Deutsch (1963) suggested again that preliminary selection of a signal is made on the basis of sensory features. The signals that get through are then compared to a set of previously stored signals. Those signals that meet both a sensory and pertinence criterion (i.e. match with the stored signals) are then selected for further analysis. This model advocates a sequence of selection which takes place after perception. Thus by 1963 two different pictures of the attentional process were apparent, one based on early selection of the stimulus (Treisman), the other based on late selection (Deutsch and Deutsch). Each held up under some experimentation however they also failed to be substantiated by other experiments. Thus, the study of attention took a turn in direction. Capacity became a focal concept as opposed to the selective mechanism in the process of attention.

Kahneman(1973) suggested that attentional capacity was limited by the amount of resources available to the system, not necessarily a blockage or limitation of the selective mechanism.

> The completion of a mental activity requires two types of input to the corresponding structure: an information input specific to that structure, and a nonspecific input which may be variously labeled "effort," "capacity," or "attention." To explain mans limited ability to carry out multiple activities at the same time, a capacity theory assumes that the total amount of attention which can be deployed at any time is limited. (Kahneman 1973)

Kahneman (1973) concluded that a study of attention must consider both structural mechanisms (eg. the selective

attention mechanism) and capacity limitations. Performance would be related to the amount of resources demanded by the task and the amount of resources available to perform the task. As Norman succinctly states:

> Since we no longer ask the question about the location of a critical attentional bottleneck in the stages of processing, the earlier debate about the locus of attention is no longer relevant. Instead, we ask exactly what resources are demanded by a task and see if the demand exceeds the supply. (Norman 1976 p.78)

Perhaps one of the most obvious implications of this view of attention concerns the concept of automaticity. The better learned the task, the more it becomes automated requiring little conscious control and thus fewer resources.

Attention is at the heart of the individual's activity in interpreting and using information, whether that information be internalized knowledge(eg. knowledge of a specific basketball skill), external knowledge (eg. a game situation), or most probably the interaction of the two (Norman 1976). The discussion will now turn to the work of Robert Nideffer (1976a) who proposed an 'Attention Control Training' program ultimately aimed to enhance performance.

Attentional Style

Dr. Robert M. Nideffer (1976a) defines attention as:

> . . . the ability to direct our senses and thought process to particular objects, thoughts, or feelings

He was the first to recognize attentional style as having two dimensions, both a breadth and direction of focus. The

breadth or width of an athlete's attentional focus refers to the amount of information an athlete has to attend to. Some situations require a broad focus of attention (eg. a three on two fast break in basketball), while others require a narrow focus (eg. a free throw in basketball). A broad focus implies an individual is able to perceive many stimuli in the environment. Easterbrook (1959) refers to these environmental stimuli as cues. Cue utilization refers to the actual cues used from the total environmental pool of cues available in any one situation. A broad focus would increase the number of cues utilized in the situation. A narrow focus implies that irrelevant information is filtered out or the range of cues is reduced.

The direction of an athlete's attentional focus ranges on a continuum from internal to external. An internal focus allows the individual to attend to internal thoughts and feelings (eg. analyze game situation and formulate a strategy), while an external focus is needed to react to environmental stimuli (eg. read defensive player and make a move to the basket).

The breadth and direction of attention are aspects of concentration that are crucial for effective performance. It is also important that the athlete is able to shift rapidly on either or both dimensions as required by the situation. For example, a basketball player must narrow her attention to execute a free throw and then must quickly broaden her attention in order to see the whole court and play team

defense after she scores the basket.

Nideffer (1980) proposes that increased arousal causes attention to narrow and internalize, and reduces one's ability to shift from one focus to another. Easterbrook (1959) also says:

> . . . emotional arousal acts consistently to reduce the range of cues that an organism uses . . . provided that initially a certain proportion of the cues in use are irrelevant cues, the reduction in range will reduce the proportion of irrelevant cues employed and so improve performance. When all irrelevant cues have been excluded, however, further reduction in the number of cues employed can only affect relevant cues, and proficiency will fall. (Easterbrook 1959;p.193)

Landers (1978) refers to the inverted U-hypothesis, proposed by Yerkes and Dodson in 1908, to demonstrate the effects of arousal on motor behavior. This hypothesis suggests that as arousal increases performance will increase to a certain point at which further increase in arousal becomes detrimental to performance. Landers (1978) also suggests that too much arousal causes perceptual narrowing of attention and therefore important stimuli are overlooked. He suggests that task demands and situational characteristics modify the arousal-performance relationship. His evidence suggests that the optimal level of arousal is lower for more difficult tasks compared to easy tasks. Wine (1971), supports the findings of Easterbrook (1959), as he found that highly test-anxious persons perform more poorly on tests than do low-anxious persons. He suggests that this difference is largely due to a difference in the attentional

focuses of high and low-test anxious persons during task performance. The high-test anxious person attends to fewer task cues than the low-test anxious person.

Each athlete has a basic attentional style which allows her to spend more time in one attentional focus than another. For example, an athlete may have a good ability to broadly focus her attention externally yet may have trouble developing a narrow focus. This preference gives each athlete different attentional strengths and weaknesses in different competitive situations. In order to assess an athlete's attentional style Nideffer(1976b) developed the "Test of Attentional and Interpersonal Style" (TAIS). He constructed this instrument to take into account (1) the situational demands of the environment, (2) the athlete's personal traits and (3) the interaction between the athlete and the competitive situation. Nideffer (1976b) developed the TAIS to reflect seventeen areas considered important for predicting performance and for making treatment recommendations.

From this six attentional scales were derived, three reflect effective attentional behavior and three ineffective attentional behaviors. The effective scales are: broad external, broad internal and narrow, and overload external, overload internal and reduced reflect ineffective attentional behaviors. The ineffective attentional styles are reflected by those individuals who scored higher on the scales of OET, OIT, and RED than they did on the scales of

BET, BIT and NAR. These individuals demonstrate difficulty narrowing their attention to avoid becoming overloaded by external stimuli. They also experience difficulty shifting their attention from an internal to external focus, or vice versa when the situation requires them to do so (Nideffer 1976a). The opposite is evident with optimal attenders.

The validity and reliability of the TAIS has been examined by Nideffer and his colleagues (Nideffer 1976b,1977). The construct validity was examined by correlating TAIS subscales with an individual's scores on other psychological measures such as the MMPI and California F Scale. Although there is very little overlap among tests designed to measure similar attentional constructs to those of the TAIS, some construct validity was found for the following attentional scales: BET, OIT and RED. Some predictive validity has been found for the attentional scales. Correlations of r=.59 to r=.80 are reported between behavior measures of swimmers and the attentional scales (Nideffer 1976b). Values ranging from .60 to .93 over all seventeen scales were found for test-retest reliability (Nideffer 1976b).

The TAIS provides a basis which allows some prediction of the athlete's ability to function effectively or ineffectively in certain situations,requiring specific attentional abilities. It does so by providing a measure of the athlete's base level of attentional abilities. This base level is a measurement of the athlete's traits, which are

seen as being stable across situations. Nideffer (1979) refers to the state component of the athlete's attentional ability as that part affected by both physical and mental factors or those situationally influenced components. He emphasizes the importance of identifying those specific situational factors that effect mental and physical control. By controlling these, the athlete will be able to perform near maximum most of the time or, minimally, the consistency of an athlete's performance can be increased(Nideffer 1980).

Nideffer (1976a) has called this entire process 'Attention Control Training' (A.C.T.). The purpose of this program is to control those situational factors that affect mental and physical control. The athlete begins this program by writing the TAIS. The TAIS provides an attentional and interpersonal profile thus allowing interpretations and recommendations to be made for each individual athlete. As well as identifying the athlete's attentional strengths and weaknesses, it identifies interpersonal attributes such as:

1. Need for control
2. Level of self-confidence and self-esteem
3. Speed of decision making
4. Extrovert/Introvert characteristics
5. Ability to emotionally and verbally express oneself

(Nideffer 1980) These factors play an important part in the interactions the athlete has with other players and the coach. Identifying strengths and weaknesses in these areas may help the athlete understand why she may have trouble in

some situations and not in others.

After the athlete's attentional and interpersonal strengths and weaknesses have been identified, it is important to understand the effect pressure or competitive stress can have on the athlete's performance. Nideffer (1980) has suggested that athletes under pressure in the competitive situation tend to revert to their attentional strengths. A different attentional focus than this may be needed in the pressure situation. The athlete is thus likely to perform ineffectively. Nideffer's A.C.T. involves the athlete identifying the 'situational stressors' that upset her and which consequently affect her performance negatively. Along with identifying these stressful situations, the athlete notes both the mental and physical responses that accompany them. This process enables the development of self-awareness and hence the athlete becomes capable of exhibiting control over stressful situations. Nideffer (1979) summarizes this process:

> First, the athlete must learn how they are affected physically and mentally by various performance situations. Next, they must be able to analyze the sport, to see what the performance demands (mental and physical) are for the competitive situations they find themselves in. Once they begin to see where their own strengths and weaknesses are they must begin to identify the situational factors that are disturbing their mental and physical abilities.

The athlete plays the most important part in the outcome of A.C.T. She must be aware of her own attentional strengths and weaknesses, the attentional demands of various situations within her sport, and try to match the two

appropriately. Further, she must recognize situations that are stressful for herself and hence realize when it is appropriate to relax. Nideffer (1976a) advocates the use of centering as a cognitive strategy to relax the individual thus allowing a refocusing of attention towards the more relevant aspects of the task. Once the centering process has taken place Nideffer suggests the introduction of various cognitive strategies in the refocusing procedure. Centering can be achieved by coordinating breathing with the conscious relaxation of certain muscle groups in the body. It can be achieved in a matter of seconds and the technique itself can be learned in just two or three sessions. Centering is a progressive relaxation technique which involves relaxing the chest, neck, shoulder and arm muscle groups. The technique is simple and allows the individual to reduce anxiety just long enough to redirect attention back to the relevant performance cues and away from the stressor.

'Attention Control Training' reflects the interactionist approach to understanding and predicting behavior. The interactionist theorists take into account both the person and the situation and the interaction of these two elements in attempting to understand and predict performance. Nideffer's TAIS measures the athlete's base level abilities or traits and is supplemented with a detailed evaluation of situational demands. A.C.T. is concerned with the athlete's physical and mental abilities:

> Mentally we are concerned with the ability to broaden and narrow attention, to focus attention internally and externally, and to be able to shift from one type of attention to another. (Nideffer 1980)

The athlete who assumes control over her behavior is aware of her abilities, mentally and physically. This control is not automatic but requires the athlete to learn and develop strategies to deal with her attentional behavior relative to changing competitive situations. Nideffer's relaxation strategy of centering was introduced to allow the athlete to relax and refocus her attention on relevant cues in the environment. The next section will deal specifically with other cognitive strategies which when used in conjunction with centering aim to enhance the athlete's ability to focus on appropriate cues. There is an array of such optional strategies available to the performer. The most appropriate strategy for any particular task will depend upon both the individual's personal profile and the task at hand.

Mental Strategies and Performance

A large number and variety of self-management techniques are being promoted on the market today. O'Neil and Spielberger(1979) have suggested that the difference between highly skilled and lesser skilled performers is the extent of mental involvement prior to, during and following motor performance.

> . . . the skilled performer must employ the appropriate cognitions associated with a specific cognitive stage, as well as possess the requisite physical qualities necessary, to yield superior performance. In contrast, the erratic and inconsistent performance of a beginner is due either to a lack of desirable physical condition and movement technique, to a lack of cognitive processing capabilities (Chi 1976), or to some combination. However, given performers with equivalent movement skills, superior performance will probably be evidenced by the person more capable of demonstrating appropriate control processes relative to changing task requirements.(Bettig 1975)

Singer(1979) emphasizes the importance of implementing learning strategies that affect processes in the acquisition, retention and transfer of motor skills. This supports the interactionist model which centers on the cognitive perceptions and interpretations of the individual in a given situation. In this case, rather than the individual being passively controlled by the situation, the individual actively controls her environment.

Focus of attention is one cognitive process that has recently been receiving much interest by clinicians and researchers alike. Morgan (1978) studied marathon runners and found that the better runners tended to associate with body feelings rather than disassociate and let their minds wander. The associaters were able to monitor body signals and therefore employ appropriate strategies for the remainder of their run. Klinger, Barta and Glas(1981) studied college basketball players to determine if there was a difference in thought content when the team was performing well as compared to when it was performing poorly. They

found that thoughts during down periods reflected on how well or badly the player or the team was doing, and thoughts during high periods concentrated on the process of playing the game. Cognitive strategies are becoming crucial for top level performance. This is indicative of the importance of an all-encompassing body-mind training program. It is thus not uncommon for an athlete's day to include mental strategies along with physical practice sessions.

Cognitive Control Strategies

Using the cognitive strategy of visual imagery, Suinn(1980) developed a strategy program called 'visuo-motor behavior rehearsal', or VMBR. The method can be divided into three phases: relaxation, the practice of imagery, and the use of imagery for strengthening psychological or motor skills. Suinn worked with the Colorado State University ski team in the hope of helping them manage their competitive tensions. After going through a progressive relaxation program, the athletes would practice athletic skills using mental imagery.

> . . . a skill learned and practiced in one situation will transfer to a new situation in direct proportion to the extent that the new situation resembles the one in which the practice took place . . .Using VMBR, the Colorado State skiers practiced racing techniques, course concentration, and improving their memorization of courses. (Suinn 1980)

Lane (1980) studied the application of VMBR to a basketball player's foul shooting ability. He found that foul shooting

percentage increased 11% after VMBR training. Kirschenbaum and Bale(1980) developed a cognitive-behavioral skills package called 'Brain Power Golf' consisting of a five-component self-regulation training program for golfers. The program included: deep muscle relaxation, planning, imagery, positive self-monitoring, and positive self-statements. A progressive relaxation program was used followed by formulation of a planning checklist prior to each shot made. The shot was then imagined and a positive self-monitoring was made after each hole. The player postponed reviewing bad shots and instead, recalled the positive aspects of their game.

Wenz and Strong(1980) refer to the use of cognitive strategies as the 'fine tuning effect' in the superior athlete. They define 'fine tuning' as,

> . . . the control and sharpening of those psychological processes that enable the physical skills to be expressed in a maximum fashion.

The focus of their 'fine tuning' program is to alter the athlete's over anxious and externally distractive response to competition through the use of various relaxation and refocusing techniques. Wenz and Strong(1980) encourage relaxation training involving muscle relaxation combined with the repetition of stimulus words. They also recommend the use of autogenic phrases which allow the athlete to concentrate on certain words, relevant to performance.

Ronald Smith(in press) refers to an 'integrated coping response'. In the same vein as the other strategy programs,

Smith's program has two basic elements: a relaxation and cognitive element. The individual first learns a muscular relaxation technique and then undergoes an analysis of thought processes replacing stress-eliciting self-statements with specific cognitions designed to reduce stress and improve performance. This stress management training program requires the individual to imagine a stressful situation and then intervene with relaxation followed by positive self-statements. Such a process allows the individual to practice successfully managing emotional responses that are frequently more intense than those elicited by normal situations.

Ziegler(1978) provides a brief overview of several other anxiety management strategies. She refers to biofeedback training which can provide the athlete with accurate information about specific parts of the body. The athlete can then recognize tense muscles, identify causes of tension and learn techniques to reduce tension. Biofeedback can act as an important motivational tool as it provides immediate feedback to the athlete. Ziegler(1978) also refers to systematic desensitization as a strategy used to overcome fear. The procedure was developed by Wolpe(1969) with the objective of pairing anxiety producing stimuli with relaxation until, at least cognitively, the anxiety is subdued. Wenrick, Dawley and General(1976) using techniques of systematic desensitization, have their clients visualize hiearchies of stimuli beginning with scenes causing little

or no anxiety and gradually moving towards those creating great fear. Under relaxed conditions the client visualizes these scenes until ultimately he/she learns to control anxiety for all of the scenes. Suinn and Richardson(1971) developed a similar program called 'Anxiety Management Training'(AMT). The procedure involves arousing the client to a high level of anxiety and then training the client to react to the anxiety with relaxation or success feelings. Nideffer(1976a) suggests using biofeedback as an adjunct to systematic desensitization by employing the feedback of muscle tension as a much more sensitive indicator of tension changes than the individual's own subjective report.

Ziegler(1978) mentions several other cognitive coping strategies in her review paper. Imagery is one such strategy in which a task oriented image is made prior to executing a skill which depicts the skill correctly and successfully performed. Thought stopping is a strategy which is particularly useful for the athlete who utilizes negative cues in her performance. The athlete is taught to recognize the negative thought and then stop it by replacing it with a task oriented suggestion. The focus is then changed from a negative to positive performance-based suggestion. Another strategy employs the use of autogenic phrases which are cue words to increase concentration on the task. She also discusses relaxation training which allows the athlete to recognize stress and relax. Although these techniques are widely used, Ziegler(1978) suggests that research in the

area is severly limited.

Mental Rehearsal

Perhaps one of the most commonly used cognitive strategies is that of mental rehearsal. It has more or less become an accepted experimental finding that mental rehearsal aids performance. Most contempory research assumes the efficacy of mental rehearsal and is aimed more specifically at such phenomena as transfer with mental practice and clinical studies in the area of psychological or physiological disorders. There is little research in the sport literature relating to mental rehearsal, but that which there is on the whole appears to accept it.

Richardson(1967a) refers to mental practice(MP) as:

> . . . the symbolic rehearsal of a physical activity in the absence of any gross muscular movements.

Richardson(1967a) examined the literature in the last 30 years and identified 25 studies that have been explicitly concerned with the effectiveness of this procedure. A variety of terms are seen in the literature: symbolic rehearsal, imaginary practice, implicit practice, mental rehearsal, conceptualizing practice, covert rehearsal techniques, all of which encompass Richardson's(1967a) definition of mental practice. Richardson(1967a) refers to the important role MP can play in the time course of a skill:

> . . . facilitating the initial acquisition of a perceptual motor skill, in aiding the continued retention of such a skill, or in improving the immediate performance of a skill.

Clark(1960) in his study of the effects of MP on skill acquisition, suggests that with an increase in task familiarity, the advantage of physical practice tends to decline. He found that physical practice was almost twice as valuable as mental practice among novice basketball players free throw ability, but in the more experienced groups mental practice appears to be as valuable as physical practice. Schmidt(1982) offers the same view. Corbin(1967) went further to suggest that mental practice can only be effective if subjects have experience in the task prior to their exposure in practicing mentally. Likewise, Mahoney(1979) suggests that an athlete's familiarity with the task can influence the effects of mental rehearsal, however, he suggests that mental rehearsal should be interspersed throughout the entire course of skill acquisition. Minas(1978), in a serial throwing task in which balls of different weights and textures had to be thrown into bins of a designated sequence, suggested that MP contributed to the learning of the sequence (i.e. the cognitive element) but did not contribute to the learning of the particular throwing actions (i.e. motor elements).

One of the best examples of mental practice effects is demonstrated by Rawlings, Rawlings, Chen, and Yilk(1972), in their rotary pursuit test. They had a physical practice group, mental practice group and no practice group. Each

subject was given 25 trials with the rotary pursuit test. The mental practice group visualized the task, the physical practice group actually performed the task, while the no practice group did nothing. Results demonstrated that the mental practice group considerably improved over the experiment, almost to the extent that the physical practice group did. The no practice group showed little effect.

Many studies have investigated the effect on performance of varying combinations of MP and physical practice(PP) trials. Oxendine(1969) investigated the effect of different schedules of mental and PP on the learning and retention of three motor tasks. He concluded that indeed a combination of MP and PP could increase the rate of learning and enhance an understanding of proper performance techniques. Stebbins(1968) varied treatment between PP, MP and a combination of the two on the learning of a motor skill. He found that only significant improvement occurred in the combination type treatment conditions. Richardson(1967a) summarizes five studies(Kelsey 1961, Trussell 1952, Riley and Start 1960, Whiteley 1962, and Egstrom 1964) in which the trend showed that an alternation of physical practice and mental practice tended to produce the greatest improvement in performance. There does not appear to be any rule designating the most effective ratio of MP to PP, merely that a combination is best.

Richardson (1967a) in a review article, makes the following tentative conclusions on the relation of MP to

performance:

1. Despite a variety of methodological inadequacies the trend of most studies indicates that mental practice procedures are associated with improved performance on the task. Statistically significant positive findings were obtained in 11 studies. Seven further studies show a positive trend and three report negative findings.
2. There is some evidence that the degree of familiarity with the physical performance of a task is related to the effectiveness of mental practice.
3. There is a trend which suggests that when mental practice and physical practice trials are alternated during the acquisition of a skill the improvement in performance will be as good or better than physical practice trials only.
4. There is some indication that mental practice sessions should not exceed five minutes if concentration is to be maintained. If mental practice trials are massed, interference or loss of motivation may result in lowered performance.

Several investigations have mentioned the importance of clear and vivid imagery in achieving any benefit from MP procedures. Start and Richardson(1964) investigated the relation between combined vividness and control of imagery and percent gain scores from MP on a simple gymnastic skill. It was found that those with vivid controlled imagery performed best, and in descending order of performance scores, those with weak controlled imagery, those with weak

uncontrolled imagery and those with vivid uncontrolled imagery.

Jones(1965) investigated the effects of directed versus undirected MP. Results indicated that subjects who participated in MP without direction were superior to those that participated with directed MP in the learning of gymnastic skills. That is, when the subjects created their own images their performance was superior to when the tester provided the image.

> The advantage of undirected mental practice over directed mental practice, when applied to the theories of motor learning, seems to suggest that the formation of the kinesthetic image is better achieved if the subject is first given the information and then allowed to try to form the complete pattern on his own, the different stimuli being organized by himself. (Jones 1965)

Mahoney and Avener(1977) found that gymnasts who used primarily internal images (i.e. feeling the body sensations) of performing the task) performed better than those using external images(i.e. developing a mental image of themselves performing the task). Thus, once again, a more active involvement in the imagery produced better results. Surburg(1967) compared the treatment conditions audio, visual, and audio-visual instruction with MP to determine the effects on developing the forehand tennis drive. He found that all of the groups using mental practice improved, however audio instruction used with mental practice proved to be the most effective method. He suggested that the visual and audio-visual groups were provided with images

through a filmstrip and hence engaged in less mental practice and profited less.

Procedures for mental practice appear quite vague in many studies. Richardson(1967b) suggests that researchers need to investigate such variables as: differences in the actual visualization procedures for carrying out MP; differences in the number of sessions used and the number of MP trials per session; and differences in the combination of physical and mental practice schedules. He sites uncontrolled practice as a major control problem in mental rehearsal studies. When comparisons are being made between a mental and physical practice group, it is possible that the MP group is engaging in more trials per unit time. This introduces an unknown influence on the outcome. He suggests that each subject keep a log of each MP trial immediately after completion to help overcome this problem. This allows the researcher to be aware of exactly what the individual is rehearsing and the frequency of the trials. Further, Richardson (1967b) suggests that the accuracy of the MP is directly affected by the familiarity of the subject with the task. Thus those unfamiliar with a task may be mentally practicing a skill incorrectly. Referring to the experiments of Clark(1960) Richardson notes:

> The greater relative gain from mental practice found by Clark(1960) in his more experienced group might be due to the greater clarity of the internalized model available for practice.

Robert Nideffer(1976a) discusses mental rehearsal as a cognitive coping strategy to be used in combination with the relaxation strategy of centering. He defines mental rehearsal as:

> . . . systematically thinking about your performance in some past or future athletic endeavor.

Nideffer(1976a) makes a distinction between rehearsal and imagery. He says that rehearsal involves an active studying of an image or a series of images while imagery merely involves the ability to develop an image without necessarily analyzing its content. Past researchers have seen imagery as a subset of mental rehearsal. An image is first developed followed by mental rehearsal of this image or a series of images. Nideffer(1976a) suggests that by visualizing situations, they can more easily be commited to memory. He feels that the use of language can be a slow and laborious process, but thinking in terms of images may be more effective and can also be facilitated by rehearsal. Nideffer(1976a) suggests that the athlete visualize a whole picture and then use this picture to remember the parts or reconstruct the parts of a performance.

> This strategy is much more effective because in any situation there's a great deal of information that doesn't need to be processed in order to be remembered. Because you have observed similar situations in the past and know what is contained within them, you don't need to catalogue the elements.

This allows the athlete to make a discriminative cue analysis of various athletic situations. Nideffer also

suggests the athlete is able to become aware of the relationships between bodily feelings and the actual performance through mental rehearsal.

> Ideally, through reflecting back on past performance and through rehearsal off the court, you learn what the good shot feels like. In this way during the game you do not have to attend consciously to all the things you're doing in order to find out what is going wrong - you just know. (Nideffer 1976a)

Nideffer(1976a) advocates the relaxation strategy centering, as a pre-requisite before any other cognitive coping strategy. This strategy acts to reduce distractions and therefore improve concentration on the task at hand. He notes that relaxation creates the conditions necessary for the mental rehearsal process. Nideffer(1976a) summarizes the benefits of using mental rehearsal to enhance performance:

> Mental rehearsal procedures, when they are effective, work because they teach you to direct attention to those cues which are most important for your performance. This means, among other things, that you learn to control your level of arousal because you are able to direct attention either toward or away from anxiety-inducing stimuli . . . you learn to deal with more complex situations, not because you are now able to think any faster, but because you are able to be more selective about what you attend to.

Overview

Several attentional theories were reviewed in an attempt to understand some of the cognitive processes within the athlete involved in competitive situations. In essence the review showed that there were two basic ways of looking

at attentional processes. The first suggested that the filter mechanism which allows the selective admission of information for further processing limited the attentional ability of the individual. The second view suggested that one's attentional capacity was limited and tasks requiring more resources than are available are not processed or only partially processed. This later view while never explicitly stated, would seem to undergird Nideffer's(1976a) 'Attention Control Training' programme. Nideffer(1976a) refers to the narrowing of one's attention in anxiety producing situations or the decreasing of one's attentional capacity. He then advocates centering and other cognitive coping strategies which aim to reinforce the pertinent cues in the environment. As part of A.C.T. the athlete writes the T.A.I.S. which allows the clinician to identify the athlete's attentional strengths and weaknesses and hence recommend strategies which allow her to best cope with the competitive environment.

Several other cognitive coping strategies were discussed which provide the athlete with the skills necessary to control her behavior and therefore enhance her performance. It was suggested that a particular strategy is chosen to suit the needs of the athlete, based on her attentional and interpersonal strengths and weaknesses.

Lastly, mental rehearsal was discussed, as one of the most widely accepted cognitive strategies. Research has fairly conclusively demonstrated that performance is

enhanced through mental rehearsal, however, little is known as to how the processes of mental rehearsal actually work.

III. Methods and Procedures

Design

The purpose of this study was to investigate the efficacy of employing Nideffer's(1976a) centering program together with mental rehearsal, as cognitive coping strategies to enhance game performance. A single subject time-series design referred to as, 'Multiple baseline across behaviors and individuals' (Kratochwill 1978) was employed to assess the effectiveness of these strategies.

Time-series designs were introduced in order to establish more reliable experimental control than designs such as the 'one shot case study' and the 'one group pretest-posttest design.' The design chosen emphasizes repeated measurement of the dependent variable:

> . . . repeated measurement under baseline and intervention conditions . . . alerted investigators to a greater range of threats to internal and external validity. Another important factor was conceptualization of such research in terms of between-group comparisons . . . (Kratochwill 1978)

The design requires that an initial stable baseline condition be established on all the behaviors to be measured. A baseline condition refers to a number of observations that are made in the absence of the independent variable or the treatment condition(Kratochwill 1978). After this stable baseline has been established on all behaviors, intervention is applied to one behavior at a time. Intervention refers to the introduction of the independent variables (i.e. the treatment, in this case centering and

mental rehearsal). It is expected that the intervention will change only those behaviors to which it has been applied, while the other behaviors remain stable. A sequential introduction of the intervention is continued until all of the behaviors have received intervention. The effectiveness of the treatment will be dependent upon the extent to which game performance departs from baseline measurements. If a change in behavior at intervention can be replicated across several behaviors and individuals, results can demonstrate that the intervention was responsible for the behavior change(Kazdin 1978).

Time-series design is valid for this study to the degree that a change in the dependent variable (i.e. the athlete's game performance) can be attributed to the independent variables (i.e. the centering and mental rehearsal strategies).

Sample Selection

The sample selected for this study consisted of four University of Alberta female intervarsity basketball players. Two starting players and two players who play a significant amount in each game were chosen. Selecting four subjects ensured that a sufficient amount of data would be collected for this study. The subjects all play a guard(i.e. point)/forward(i.e wing) position on the offense. This was necessary in order to have data on similar behaviors for

each subject. Only subjects who were motivated to participate in 'Attention Control Training' were selected as subjects. This was determined by the principal investigator who discussed the program with the subjects and determined their attitude towards A.C.T.. A.C.T. requires the individual to take the initiative to learn how she can capitalize on her attentional strengths and deal with her weaknesses in the most effective manner according to the situation. The effort required in order to achieve success from the A.C.T. program was explained to each subject and each of the participating subjects accepted responsibility to do so.

Instrumentation

An instrument was developed to measure six basketball situations representing the behaviors Broad-external(BET) and Narrow(NAR) focus of attention. The instrument measured three BET and NAR situations defined specifically in relation to the basketball team offense and defense. It is as follows:

Behavior A:BET(Broad External Focus of Attention)

Operant 1: Point - Ball entry

Key points: Ball to the wing, if overplayed backdoor pass to wing, or look to posts popping high or dribble entry by the point or a reverse, or shot.

BEST Read defense - if overplayed backdoor, or post in or

dribble entry or reverse or shot

Best possible entry given

OKAY Ball got in with trouble

Took too much time

Not necessarily the best option

WRONG Ball intercepted

Operant 2: Wing - Ball entry

Key points: Read defense - shot or drive?

Point cut - is she open? Are the posts open?

Reverse the ball if no option is open

BEST Read defense - shot or drive or pass into the open post or point or reverse

Best available option was chosen.

OKAY Ball got in, not necessarily the most appropriate entry

WRONG Ball held for five seconds or a turnover.

Operant 3: Press(Z) or Man-to-man(M)

Key points: Clamp - parallel to the ball, jump - coming behind the ball

BEST Stole ball

OKAY No advantage, able to get back on defense

WRONG Wrong position on press or didn't read opportunity

Behavior B: NAR(Narrow focus of attention)

Operant 4: Drive

Key points: drive to basket on fastbreak, drive and stop for shot or pass

BEST Scored off drive

OKAY Fouled and didn't score, lack of sympathy from

teammates

WRONG Didn't score

Operant 5: Passing

Key points: passing in press break or fast break or headman from backcourt

BEST Ball got in and was at target

OKAY Ball got in, but was not at the target

WRONG Missed target, intercepted

Operant 6: Receiving

Key points: same situations as passing

BEST moved to the ball and received the pass

OKAY Received the ball but fumbled it

WRONG Ball intercepted or missed

The player was rated on each of the six situations as 'best', 'okay', or 'wrong' by the principal investigator and another judge - a well experienced basketball player. In order to receive a 'best' for example, the player had to make the correct decision for action based on the game situation she was in.

The basketball 1981-82 home games (i.e. 12 games) were video-taped and analyzed using the instrument developed to measure the BET and NAR behaviors. A team consisting of the principal investigator and an assistant observed and recorded each time one of the six situations occurred and categorized them according to 'best', 'okay', or 'wrong' (See Appendices). Exhibition games were used to establish inter-observer agreement of the instrument. Initially, the

video-tape was viewed by both observers establishing agreement on both identifying the six situations defined and rating them as 'best', 'okay', or 'wrong'. After viewing five games inter-observer agreement was established by each observer viewing a game separately and then comparing results. A criterion of 70% agreement between the two observers has been recommended(Kazdin 1977; Johnson and Bolstad 1973). An agreement of 85% was reached in this study across all BET and NAR behaviors. This agreement score was established taking into account both the occurrance of each behavior and rating of each situation as 'best', 'okay', or 'wrong'. Frequencies of the behaviors ranged from a low of three occurrances to a high of twenty-two occurrances. Observer drift was controlled by the observers viewing a tape together midway through the season. Fifteen percent of the data was randomly checked by both investigators to also help control for observer drift.

The TAIS and stressor sheets were administered to the subjects prior to the first exhibition game to attain an attentional profile of the athletes which showed attentional strengths and weaknesses. The stressor sheets asked the athletes to identify mental and physical responses they had to stressful situations on the court. The tests were hand scored by the principal investigator and profile summaries and treatment recommendations were made for the entire team(See Appendices).

Internal and External Validity

Kratochwill(1978) refers to internal validity as the degree of certainty that manipulation of the independent variable is responsible for observed changes in the dependent variable. He notes the possible threats to internal validity that multiple baseline design across behaviors must consider: history, maturation, testing, instrumentation, instability, change in unit composition, and reactive intervention.

In this study, history and maturation could possibly cause a confounding effect with the treatment. Both were controlled to some degree by using repeated measurement. Repeated measurement necessitates that the investigator repeatedly measures the behaviors over the given time frame for the study. The following example will explain the importance of this: An extreme value may be found on a behavior when first measured however, it later returns to its pre-intervention level. This could indicate that some extraneous event has occurred(i.e. an historical event) at that time to effect the behavior.On the other hand, an extreme value could occur, without intervention having taken place, and not return to a prior level. This may suggest that maturation has occurred. This study continued for the duration of the basketball season(i.e. Oct. - March) and consequently it was expected that players would improve over time. Though each home game series was chosen as an intervention date, it is unlikely that extraneous variables

would effect the intervention in such a regular sequence as the games were relatively close together in time. The players were instructed not to talk to each other about the treatment they were receiving. To avoid manipulation of these intervention procedures by the head coach, she was not informed of their specific details. She was not aware of the behaviors which were being stressed each week. These procedures provided some control for history and maturation. There was a delay in intervention across behaviors and and individuals to control for history and maturation. This ensured that subjects and behaviors that showed a treatment effect could attribute this effect to intervention.

Instrumentation effects were controlled by checking the reliability and consistency of observer recording procedures. Approximately 15% of the data was randomly checked by both investigators. This process ensured that the recording rules were adhered to. In 80% of the reliability checks there was congruence between the two observer's results thus meeting the recommended criterion of 70% agreement (Kazdin 1977; Johnson & Bolstad 1973).

The weakening of internal validity caused by instability of the results was seen as a possible threat but had to be accepted. Variability of performance appears to be quite characteristic of young players who lack playing experience and who are still learning the motor and cognitive skills in basketball. Such was the case of those players selected. To control for this analysis took into

account not only change of level and trend between baseline and treatment but also change in variability.

To control for changes of the experimental unit composition due to natural attrition such as injury or poor performance, four subjects were chosen who play the same position on the Panda offense. If one player became injured or missed games for any other reason, the remaining players could still provide a sufficient amount of data on the BET and NAR behaviors.

Reactive intervention refers to those situations in which intervention is applied when the data is at extreme values. For example, an investigator may wait until the data points are extremely low, apply an intervention and attribute a positive change to the intervention or treatment. In this study interventions were applied from a predetermined time schedule. This ensured that intervention was not applied at extreme data points, but rather it was applied consistently throughout the twelve games.

Kratochwill(1978) refers to external validity as the extent to which the results can be generalized to other subjects and settings. He notes the following factors to consider as possible threats to external validity: independent variable description, Hawthorne effects, novelty and disruptive effects, experimenter effects, pretest sensitization, posttest sensitization, interaction of history and treatment effects, measurement of the dependent variable, interaction of time of measurement and

intervention effects, and referent generality.

The independent variable has been explicitly described and therefore invalidity due to an inadequately described independent variable is minimal. The subjects chosen were aware that they were partaking in an investigation involving Nideffer's(1976a) A.C.T. The subjects had all received some A.C.T. prior to the investigation(i.e. lecture and discussion of A.C.T), but the Hawthorne effect and novelty and disruption effects are still acknowledged as a slight threat to external validity. However, again the delay of intervention and extending the intervention over time helps control for this. Pretest and posttest sensitization was not applicable to this investigation as the intervention(i.e. centering and mental rehearsal) was not in the form of tests and the testing of the dependent variable was relatively unobtrusive. The external validity threat of interaction of history and treatment effects was controlled by repeated measurements which allowed the observation of a consistent trend over time. This control also kept the threat of interaction of time of measurement and intervention effects at a minimal level. Experimental effects are acknowledged as a potential threat to external validity in that unintentional behavior by the principal investigator may have influenced the subjects, however, an attempt was made by the investigator to follow an invariant procedure. Implementation of the treatment program may possibly have generated some experimenter bias. Again, this effect should

have been minimal due to the fact that treatment and procedures were consistently applied by the principal investigator who followed a set protocol.

The measurement of the dependent variable was reliable in that interobserver agreement was established on the BET and NAR behaviors. Content validity is considered evident to the extent Nideffer(1978) has shown construct validity on the BET and NAR behaviors.

Referent generality was apparent in the study. The investigation was concerned with the effects of relaxation and mental rehearsal on game performance and although this focus is quite narrow, it has implications for the use of different cognitive coping strategies in sport.

Treatment

'Attention Control Training' treatment procedures began on October 14, 1982, for the 1981-82 basketball team. The timetable of events is outlined below:

Oct. 14 - TAIS administered - basketball team

Oct. 15 - Scoring of TAIS

Oct. 23 - Handout given to the team introducing A.C.T. followed by a lecture and discussion

Oct. 27,28 - TAIS interpretations and recommendations (four subjects were chosen based on their attitudes towards A.C.T.)

Nov. 2 - Stressor sheets administered to the subjects (after first 2 exhibition games)

Nov. 9-26 - Centering practice - daily prior to practice and at specific intervals during practice (i.e. break in play, free throw)

Nov. 18 - Introduction to the 'Galvanic skin resistance' (GSR2) instrument - this biofeedback relaxation system was used to aid the player in learning to center. The GSR2 provides a reflection of variations in sweat gland activity and pore size. As the individual becomes frightened, nervous or excited to any degree, the nervous system activates chemical and physical changes through the body and consequently the GSR level also changes. The GSR2 monitor is a pocket size instrument which monitors those changes. The changes are represented in the form of a constant noise which increases in pitch as tension increases thus providing immediate feedback to the individual. The GSR2 was used to help the player identify physiological changes in her body that indicated an increase in the level of tension. Table 1 outlines the intervention schedule followed in this study:

Intervention Procedures

Each week a private session was conducted with each player. The following procedures were carried out:

1. Relaxation (i.e. centering) using the GSR2

instrument(i.e. 5-10 minutes).

2. Mental rehearsal of both unsuccessful and successful experiences involving the behavioral situations designated, using the GSR2 instrument. A variety of modifications were made to accomodate the needs of the individual players. Situations were verbalized by the investigator and the players rehearsed them. In other instances, the player both verbalized and rehearsed the situations. These interactions changed relative to the ability of the player to visualize the situations(i.e. 15-20 minutes).

3. The player was instructed to mentally rehearse these situations on her own as often as possible prior to competition.

4. The night prior to competition the player was given a mental rehearsal checklist providing her with relevant cues for the behaviors to rehearse.

Treatment of the Data

The data obtained on each subject was plotted on graphs according to 'best', 'okay', or 'wrong', using raw scores and subjected to visual analysis. The graphic representations were assessed according to trend, level and variability of performance over time.

> In essence, the function of the graph is to communicate, in a readily assimilable and attractive manner, descriptions and summaries of data that enable a rapid and accurate analysis of the facts. (Kratochwill 1978)

Table 1. Intervention schedule

GAME	PROCEDURES	SUBJECT
1,2	baseline data	1,2,3,4
3,4	Intervention-centering(C)	1,2,3,4
5	C & Mental Rehearsal(MR) (sit. 1,2)	1,3
5	hold on intervention	2,4
6,7	C & MR (sit. 1,2)	1,3
6,7	C & MR (sit. 1,2)	2,4
8,9	C & MR (sit. 1,2,3,4)	1,3
8,9	C & MR (sit. 1,2)	2,4
10	C & MR (sit. 1,2,3,4,5,6)	1,3
10	C & MR (sit. 1,2,3,4)	2,4
11,12	C & MR (sit. 1,2,3,4,5,6)	1,3
11,12	C & MR (sit. 1,2,3,4,5,6)	2,4

sit. 1 - Ball entered from point position (BET)
sit. 2 - Ball entered from wing position (BET)
sit. 3 - Player position on the press (BET)
sit. 4 - Drive (NAR)
sit. 5 - Pressure passing in backcourt (NAR)
sit. 6 - Receiving pass (NAR)

IV. Results and Discussion

Results

The major purpose of this study was to investigate the efficacy of employing Nideffer's(1976a) 'Attention Control Training' program using specific cognitive coping strategies in a basketball training program. The effectiveness of these strategies was measured in basketball game situations which were selected as representing either a broad external(BET) or narrow(NAR) focus of attention. It was hypothesized that performance would be enhanced after intervention on the selected behaviors.

A subproblem of the study was to determine the relationship between a player's initial 'Test of Attentional and Interpersonal Style' TAIS profile and the performance results after intervention on the BET and NAR behaviors. It was hypothesized that some congruence would exist between the player's TAIS profile and those behaviors intervened upon. The results are organized as follows:

1. Effects of intervention on BET and NAR behaviors
2. TAIS results

Table 2 briefly summarizes the performance results in each BET and NAR situation across subjects. It shows both positive and negative intervention results for each subject across behaviors. Those situations which did not achieve a set standard of occurrances are also indicated in the table, however they are not a part of the visual graphic analysis.

Table 2. Performance Results for BET and NAR Situations

	BET (POINT)	BET (WING)	BET (PRESS)	NAR (DRIVE)	NAR (PASS)	NAR (RECEIVE)
S_1	YES	NO	NO	*	YES	*
S_2	YES	NO	NO	*	NO	*
S_3	YES	YES	*	*	*	*
S_4	NO	YES	0	*	*	*

S - subject
YES - positive performance results
NO - negative performance results
0 - no change from baseline
* - eliminated due to low frequency

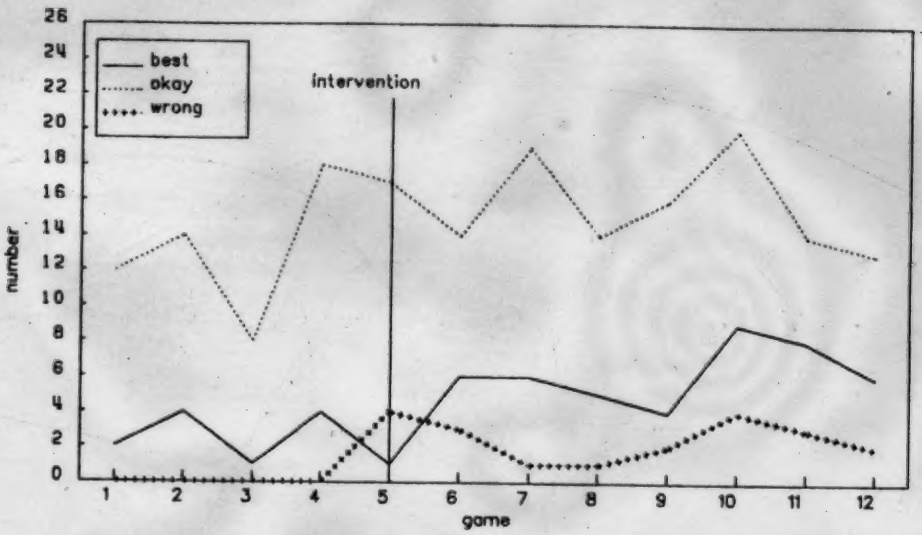

Figure 1. Subject 1 – Ball entered from point position

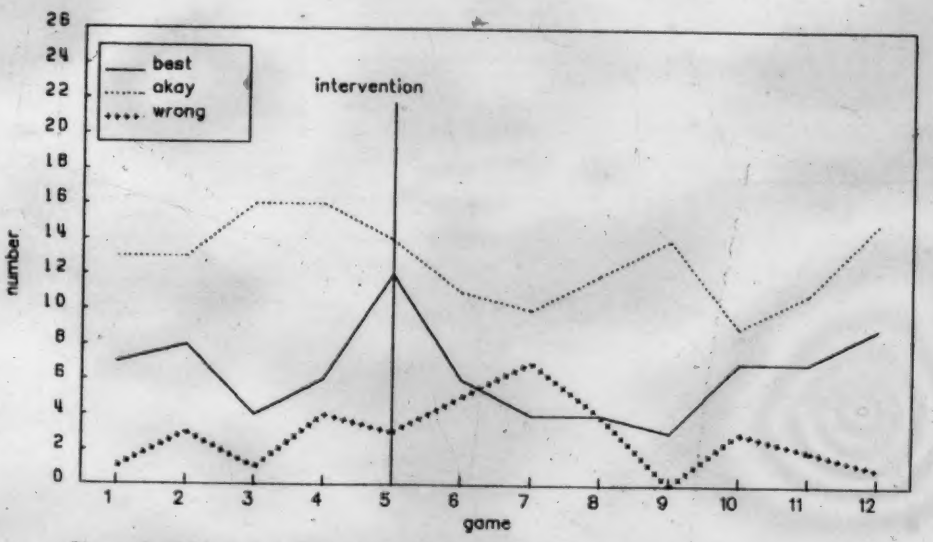

Figure 2. Subject 1 – Ball entered from wing position

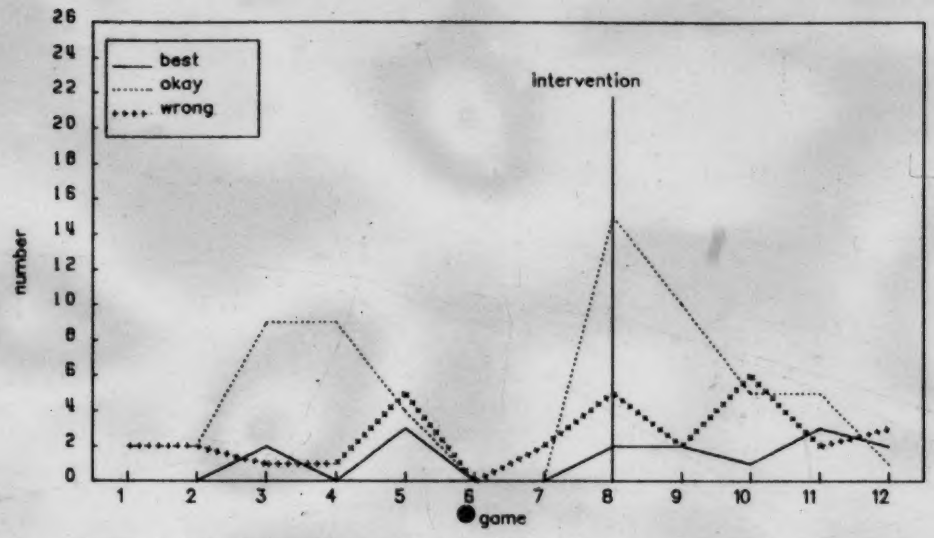

Figure 3. Subject 1 – Player position on the press

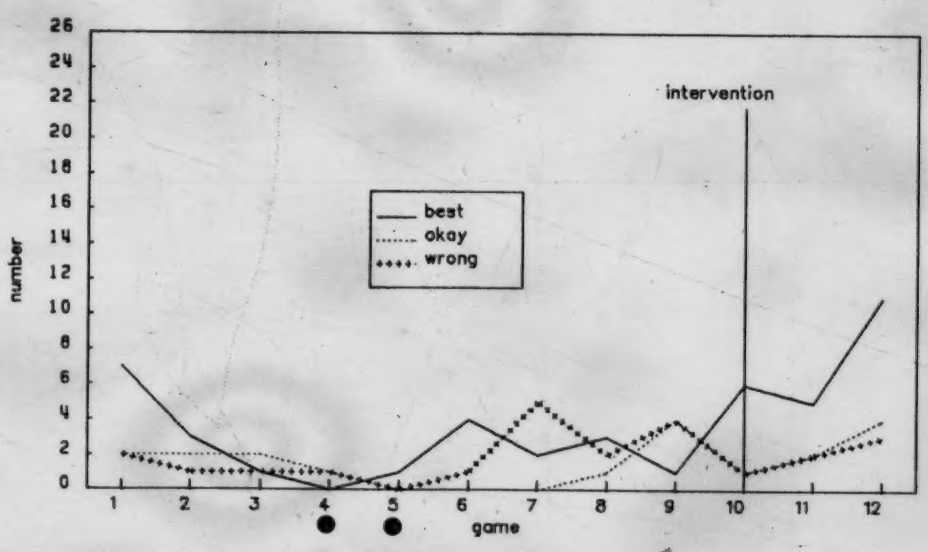

Figure 4. Subject 1 – Pressure passing in backcourt

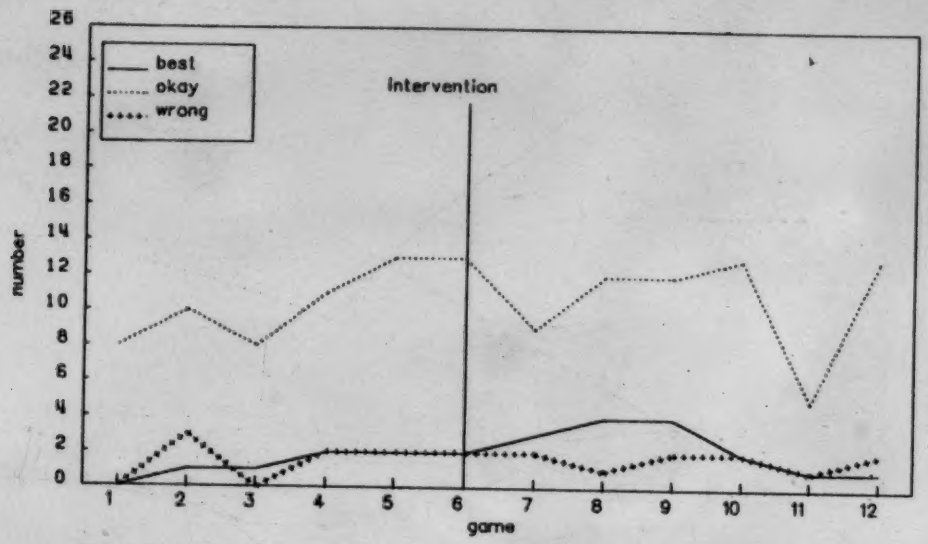

Figure 5. Subject 2 – Ball entered from point position

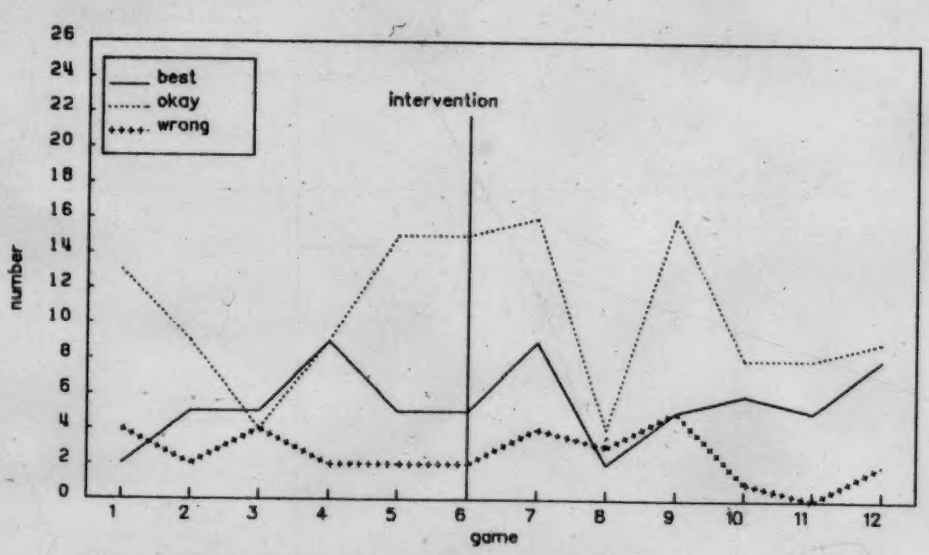

Figure 6. Subject 2 – Ball entered from wing position

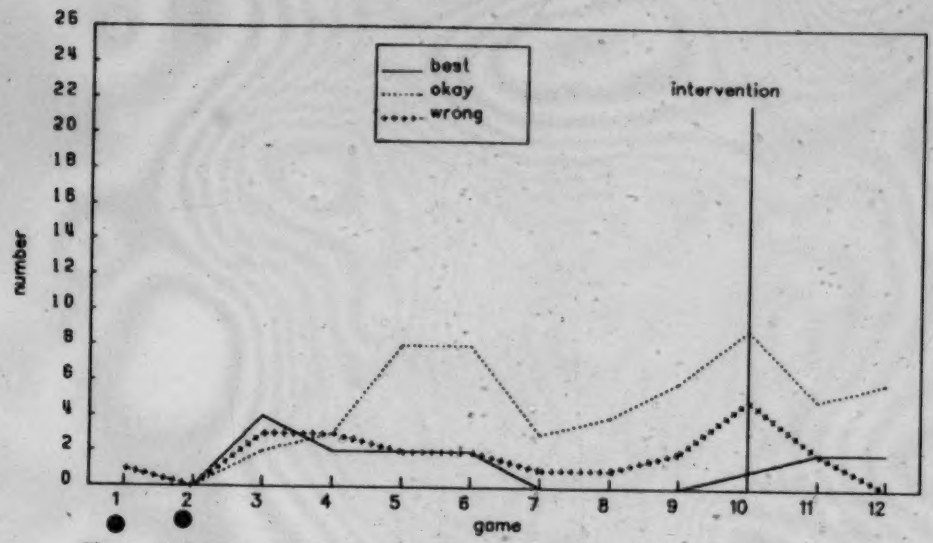

Figure 7. Subject 2 – Player position on the press

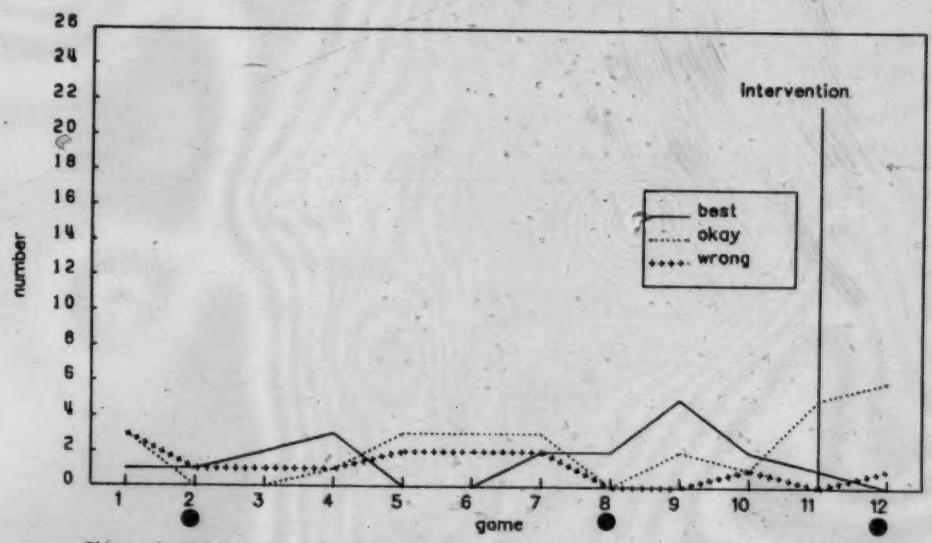

Figure 8. Subject 2 – Pressure passing in backcourt

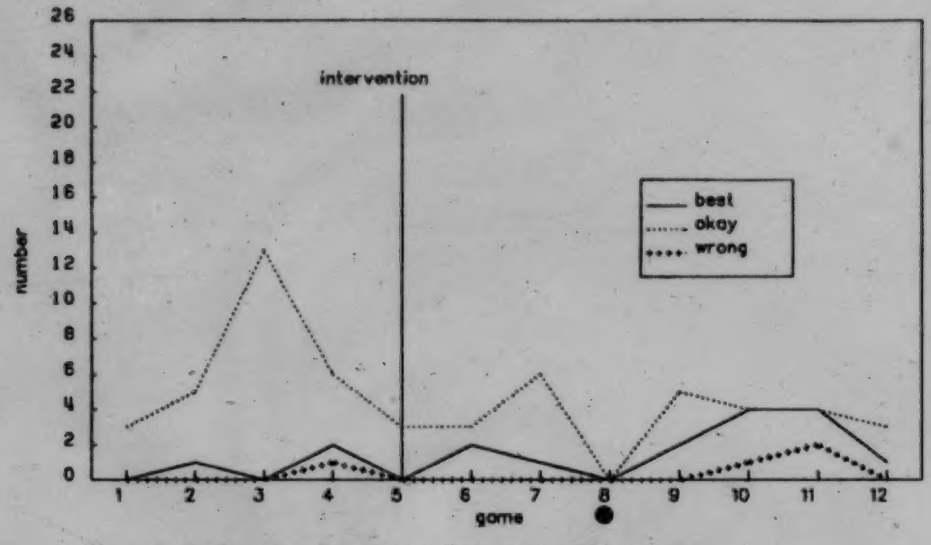

Figure 9. Subject 3 – Ball entered from point position

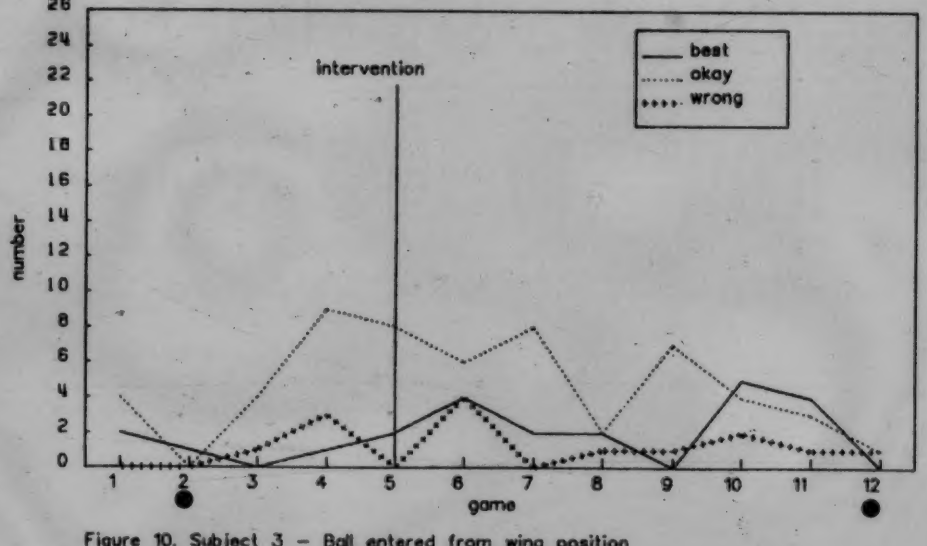

Figure 10. Subject 3 – Ball entered from wing position

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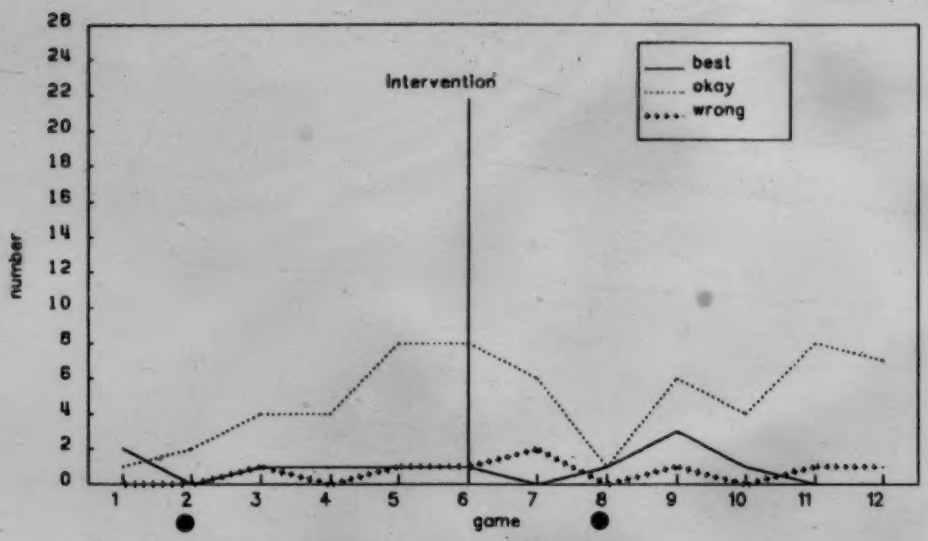

Figure 11. Subject 4 – Ball entered from point position

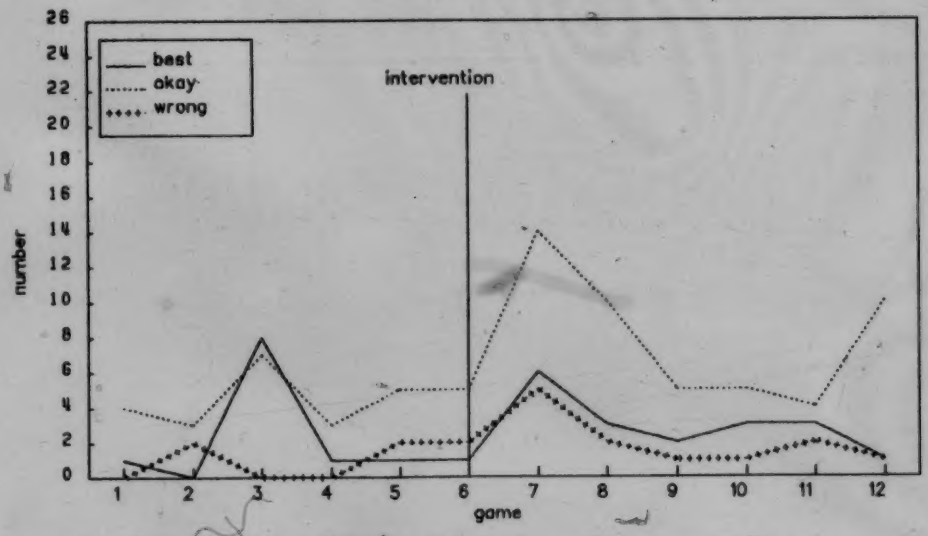

Figure 12. Subject 4 – Ball entered from wing position

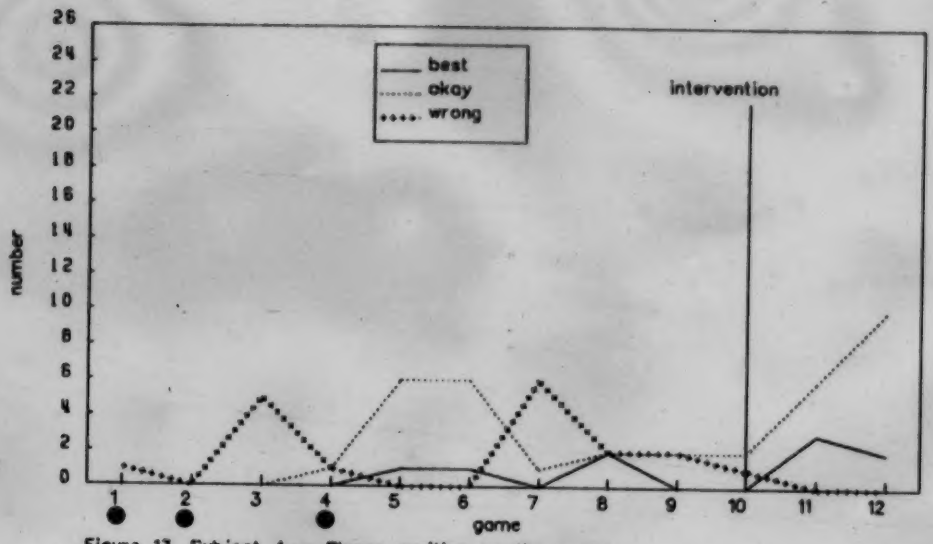

Figure 13. Subject 4 – Player position on the press

Intervention effects - BET and NAR behaviors

Results suggest that intervention had some effect on the BET and NAR behaviors. The results of each behavior are discussed according to variability, trend and level during baseline, at intervention and post intervention. Generally, subjects demonstrated considerable variability in baseline measurements across behaviors, making it difficult at times to interpret results.

However, the following criterion was established and adhered to during the data analysis.

Level

The greater and more abrupt the change in level from baseline to post intervention, the more convincing the data appears. In this study a criterion was established which required 50% of the data points after intervention to be higher than 80% of the baseline points.

Trend

Ideally, baseline data should remain stable over the length of the phase. Because a great deal of variability existed for this study, changes in trend were assessed relative to this varying baseline data. An effect was said to have occurred if there was a systematic upward shift in direction after baseline. No effect was said to have occurred if there was a systematic downward shift. If baseline data was horizontal(i.e.slope approximating zero) a change in level was sufficient to show an effect. If baseline data had a positive slope then both level and

increase in slope had to be seen in the data after intervention.

Variability

Variability was assessed during baseline and after intervention. If a highly variable baseline became stable after intervention, a positive effect was said to have been apparent regardless of whether or not there were changes in level or trend.

In order to attribute change to the effects of treatment the trend and level criterion or the variability criterion had to be met. The data results were analyzed according to the 'best' responses made by the player in the six basketball situations. It was the 'best' situations that were designed to show improvements in performance and hence they provided the most effective means of demonstrating treatment effects. In most instances where there was an increase in 'best' responses made there was a corresponding increase in 'okay' responses and a decrease in 'wrong' responses made and vice versa. 'Best', 'Okay' and 'Wrong' responses were graphed for each behavior and displayed in Figures 1-13. Vertical intervention lines indicate the first game after intervention. Data points where the frequency of the event was less than three were not included in the analysis though they were displayed in the graphs. A star under the game number indicates these instances.

BET behavior - Ball entered from point position

Subject one (figure 1) appeared to demonstrate a positive intervention effect. Although there was variability in baseline, an upward trend was evident after intervention. A change in level after intervention was apparent as the lowest data point was higher than any baseline points. Subjects two and four (figure 5 & 11) both demonstrated some variability throughout baseline and intervention. There was a slight delay after intervention followed by a gradual upward trend which was not maintained throughout all of the games in both of the subjects. Subject two(figure 5) met the criterion for level, trend and variability however subject 4(figure 11) does not have a sufficient change in level and demonstrates too much variability throughout phases. Subject three (figure 9) exhibited inconsistency in baseline performance but meets the criterion for changes in both trend and level. Three of the four subjects showed a positive intervention effect in this situation, however, this effect was not maintained throughout all the games.

BET behavior - Ball entered from wing position

All of the subjects demonstrated some variability in performance over time, however, subjects two, three and four (figure 6,10,and 12) displayed an upward trend immediately following intervention. Subject three displayed a gradual increase in slope prior to intervention, which may indicate the data was on its way up regardless of the treatment. This upward trend was followed by some variability in all of the

subjects. Subject four, however, did stabilize over time and subject one, while exhibiting a drastic change in level at intervention (figure 2), did not maintain it over time. Subject 1,2 did not reach the required standard for a change in level after intervention and therefore cannot be accepted as demonstrating a positive effect from the treatment. However, subject three and four do meet the criterion in all three categories.

BET behavior - Player position on the press

Subjects one and two (figure 3 & 7) showed some variability in baseline and post intervention data. None of the subjects demonstrated changes in trend or level over time.

NAR behavior - Pressure passing in backcourt

Subject one demonstrated a downward trend in baseline data and an upward trend following intervention(figure 4). There was also an increase in level from baseline to post intervention. Some variability existed in subject one during baseline which was not enough to disqualify the apparent treatment effects for this situation. Subject two demonstrated no effect from the treatment.

Frequency

The frequency of the behaviors being measured was required to have occurred a minimum of five times in each game for the veteran players(subject 1,2), and three times for the novice players(subject 3,4) in order to be included in the visual graph analysis. The frequency of behaviors for

each subject is displayed in the appendices. The frequency of those behaviors which were high enough to be included for graphic analysis appears to be quite stable across situations for each subject. The following data were not used as they failed to reach this standard:

Subject one - Drive, Receiving a pass

Subject two - Drive, Receiving a pass

Subject three - Drive, Receiving a pass, Pressure passing in backcourt, Player position on the press

Subject four - Drive, Receiving a pass, Pressure passing in backcourt

Game six - not available for subject 2 & 4 (i.e. This tape was inadvertently erased prior to recording the data).

TAIS profile and the data results

Passing, a basketball skill identified as requiring a narrow focus of attention, was enhanced after intervention for subject one(figure 4). Subject one's TAIS results suggested that she had a very good ability to narrow her attention.

Subject two demonstrates an intervention effect in one of the situations identified as requiring a BET focus of attention. Her TAIS BET score is high, indicating that she can effectively integrate a large amount of information. Subjects one, three and four were all described as having an average ability to integrate information and showed some

intervention effect in these situations. Subjects two, three and four were described as having an average ability to narrow their attention. The frequency of the NAR behaviors being measured was not sufficient for subjects three and four and subject two showed no effect after intervention on the NAR behaviors. Subject one and two who both have effective attentional profiles on the NAR and BET behaviors respectively, showed some positive intervention effects in those situations identified as representing the behaviors(i.e. assuming frequency was high enough in the specific situations).

Discussion

Hypothesis 1

No intervention effect

The results of this study suggest that the intervention employed did not produce a positive change in performance on all behaviors or across all subjects. Generally no effects were primarily found in the situations requiring a NAR focus of attention. The following discussion speculates as to why these results were found.

The frequency of several situations was not sufficient to warrant their inclusion for discussion. It is speculated that these low frequencies can be attributed to two factors: instrument problems and/or lack of playing time experienced by the novice players. Interobserver agreement scores indicated that there was no problem in reliably recording the data. The behaviors were well defined and reliably

observed. Thus none of the situations defined assumed to represent BET and NAR behaviors were missed by the judges. Two situations requiring a narrow focus, the drive and receiving a pass, did not attain a high enough frequency for inclusion in the results for any of the subjects. This suggests a need for chosen situations to have more frequent behaviors.

Subjects three and four were first year Panda basketball players. These two players received less playing time than subjects one and two, which offers some explanation for their lower frequency on all of the behaviors.

Extreme variability in baseline and post intervention data was evident throughout subjects and behaviors. This variability indicates that the treatment package was not strong enough to completely overcome game to game inconsistancies in performance. Kratochwill(1978) notes this problem in time-series design data and suggests that it signals the presence of a variable other than the treatment variable operating to control the subject's behavior. In this study, lack of experience particularly in subject 3 and 4, may have accounted for such variability. Richardson (1967a) found that the degree of familiarity with the physical performance of a task effects the efficiency of mental practice. This statement is further supported by numerous studies(Clark 1960, Corbin 1967, Mahoney 1979, Schmidt 1982) which claim that mental practice is highly

effective for experienced players, but its effects are minimal for novice players. Although only subject three and four were novice players, subject one and two both had limited playing experience being only third and second year players respectively. Such extreme variability may have been reduced if more experienced players had been available for this study.

The mental practice literature presents limited and conflicting evidence in respect to the actual procedures for carrying out mental practice. Richardson(1967a) concludes after summarizing several investigations, that mental practice alternated with physical practice tended to produce the greatest improvement in performance. Although the subjects in this study alternated mental and physical practice to some degree, further investigation is needed to determine the most appropriate schedules for both. The sessions in this study were one half hour in length twice a week. There is some evidence(Twining 1949) that MP sessions should not exceed five minutes for concentration to be maintained. Better results may have been obtained if the sessions were more frequent and of shorter duration each time.

Several investigations have noted the importance of attaining clear and vivid imagery in achieving any benefit from mental practice procedures (Start and Richardson 1964, Clark 1960, Jones 1965, Mahoney and Avener 1977). Mental rehearsal was relatively new to all of the subjects in this

study. Each subject reported an improvement in her own ability to develop images from session to session. As subjects reported problems imagining certain situations, modifications in verbal interactions were made in order to accommodate the individual athlete's style. Changes were made regarding: the amount of time allocated for visualizing scenes, the number of scenes rehearsed and the actual method of rehearsal. The last session with the subjects was modified from a previously passive visualization where each athlete imagined the situation as it was verbalized to her, to a situation where the athlete was asked to verbalize and visualize the situation simultaneously by herself. This latter method ensured that the athlete was rehearsing all aspects of the game situation and was not deleting important parts that could negatively effect performance. Results on the last intervention did not differ from performance results after prior interventions, suggesting that modifications may not have confounded the study.

Positive intervention effects

Ball entered from point position

Three out of four of the subjects demonstrate a positive intervention effect in the point position. These players all had a slight delay in performance change which can be attributed to a latency in the emergence of a treatment effect(Wasson 1980). Reasons for a delay in effect

could be attributed to various factors such as: nervousness during first sessions; improved ability to visualize over time; improved concentration, etc. A further look at subjects two and four indicates that they were unable to sustain their enhanced performance throughout the remaining games. Subject one displayed some variability over time, but was able to sustain this improvement in performance over the remaining games. Because the majority of subjects were unable to sustain enhanced performance over time, it is probable that the procedures for intervention may not have encompassed a sufficient number of sessions or trials per sessions.

Ball entered from wing position

Subject 3 and 4 appeared to increase their game performance on the BET behavior in this situation. Subject one displayed an immediate dramatic change in level at intervention but was not maintained over time. She began to display an upward trend in the last four games, the level, however, not surpassing baseline heights. Subject two was unable to meet required level changes, however she did demonstrate an upward trend after intervention.

Variability in performance existed with all of the subjects, intervention effects again failed to endure over time. These results demonstrate: variability, lack of maintenance and delays in intervention effects, each which question the effectiveness of the procedures employed. It appeared that the treatment was working, but needed to be

stronger to ensure consistency in performance throughout all games.

Pressure passing from the backcourt

Subject one revealed a distinct change in behavior after relaxation and mental rehearsal in this situation. This was evident by the change from a downward trend to an upward trend following intervention. Intervention was not applied until game ten, making it difficult to assess the long term effects of the treatment. Likewise, subject two did not receive intervention until game eleven at which time an upward trend began, however it is not possible to see if this trend would have continued over time.

Player position on the press

The results of this BET behavior did not show an upward trend or change in level of performance across any of the subjects.

Hypothesis 2

Hypothesis two suggested that a positive relationship would be revealed between a player's initial TAIS profile and the results after intervention on the BET and NAR behaviors. Although results of the initial TAIS score did not predict perfectly intervention results, there were some interesting findings.

Subject one had the best results. Her TAIS profile indicated that she had a very good ability to narrow her

attention, which was confirmed with the positive results found on the NAR behavior, pressure passing in the backcourt(figure 4). She was the only subject who showed a positive trend in a game situation on any of the NAR behaviors. The two other NAR situations(i.e. Drive & Receiving) did not attain the required frequency to be included in the graphic analysis. Subjects two, three and four, all described as having an average ability to narrow attention attained no positive results after intervention. Overall, subject one attained more positive results than any of the other subjects. She demonstrated positive intervention effects in situations representing both BET and NAR behaviors. It is speculated that because this player was assessed as having a very good ability to narrow her attention, she was better able to visualize and hence benefited from relaxation and mental rehearsal more than the other subjects.

Subject two's TAIS results indicated a high BET score. One situation requiring a BET focus revealed some positive results(figure 5). The other subjects' profiles suggested they had an average BET focus of attention. Subject 1 and four attained some positive results in the BET situations.

Previous discussion on the intervention effects indicated that there were problems with the instrument in measuring some behaviors. Most of the situations requiring a NAR focus of attention were not included in the graphic analysis due to low frequencies. Therefore, it is not

possible to make any conclusions for these NAR situations in relation to the TAIS. However, those behaviors on which intervention demonstrated treatment effects, correlated positively with TAIS profile interpretations.

The results of the TAIS profile interpretations (Appendix II) provide insight regarding the subject to subject differences that should be considered when applying mental rehearsal procedures. For example, the study showed the variety of attentional profiles that are evident on this particular basketball team (i.e. three of four were different) which the coach must take into consideration. The player's TAIS profile is helpful in identifying weak attentional areas and hence ensures that proper emphasis is placed in these specific attentional spheres during treatment.

Log Book

Throughout the basketball season a log book of events was recorded by the principal investigator. This introspection primarily served to record those subjective feelings the players had regarding intervention procedures and treatment effects.

All of the players felt that the GSR2 instrument was a valuable aid in learning the difference between tension and relaxation. The players also reported that the instrument made sessions fun and interesting and also enabled them to

become aware of pressure situations that upset them. For example, one of the subjects found just how tense she became when the coach raised her voice. Another player had a distinct increase in the tone on the GSR2 whenever she took a shot. The players became consciously aware of pressure situations such as these and concentrated on relaxing in such situations. By going through the mental practice situation, they felt they became better able to deal with them in real game situations. This, of course, was not fully borne out in the experimental results, however it should be kept in mind that the results may be in part, a reflection of limitations in the choice of behaviors that were studied and treatment procedures, than actual treatment effects.

Subject one and four showed the most interest in using the GSR2 instrument and spent many extra hours practicing relaxing and mental rehearsal. The results of this extra involvement may have somewhat effected the study results. Richardson (1967b) refers to uncontrolled practice in mental practice studies as a potential confounding factor. An unknown influence could be effecting the outcome. He suggests that one way of overcoming this problem is for each subject to record the result of each MP trial immediately after completion. This allows the researcher to be aware of exactly what the subject is rehearsing and the frequency of trials. Subject one attained the most positive intervention results from the treatment. This may well be a combination of her dedication and diligence in carrying out the program

and a reflection of her good ability to narrow her attention as measured by the TAIS. Although subject four did not attain these same effects, she did have some positive results from the treatment(figure 12). Subject four was assessed as being a very nervous, tense person from her stressor sheet interpretations. Her initial relaxation training sessions indicated that it was very difficult for her to relax, even under normal everyday living conditions. She noted significant improvements from session to session in her ability to relax. Further, she felt she became more conscious of pressure situations in games and was able to center herself, regain control and continue to play. Thus while test results were minimal, her introspective comments indicated she at least felt that treatment was helping her game performance.

Another important variable which was recorded in the log book was a progression of each subject's ability to visualize. Each subject perceived an improvement in her ability to visualize from session to session. This finding suggests the necessity for having a sufficient number of training sessions to ensure the athlete has actually learned how to visualize.

In the first mental rehearsal session, subject one was quite astute in recognizing the difference between imagining watching herself perform versus actually feeling herself go through the entire performance sequence. She reported that MP was most effective for her when she felt herself

performing the skill. This significant distinction is reported by Mahoney and Avener(1977) who found that those gymnasts who felt themselves executing the skill (i.e. those who used internal images) performed better than those merely viewing themselves performing(i.e.those who used external images). The mental practice literature reports an abundance of studies emphasizing the importance of vivid and clear visualization for mental practice to be effective(Surburg 1967, Start and Richardson 1964, Jones 1965, Clark 1960). Subject three reported having the most difficulty visualizing during the mental rehearsal sessions. In one session she felt that she was two or three feet outside of her body, unable to get in. Although she reported improvements over sessions, her trouble visualizing may be reflected in minimal positive post intervention results (i.e. only in one situation, figure 10).

Mental practice may have important implications for familiarizing players with game skill procedures. For example one subject described a type of deja vu. She recalled a situation in which she drove one on one to the basket for the first time in an actual game that season. She felt she had already been through it recently. The experimental results of this situation, the drive, however, were not used as the frequency did not reach minimal levels. This sort of subjective comment is a positive reflection on the value of mental rehearsal in terms of orienting players to skill execution.

An interesting comment was made in one mental rehearsal session. Subject one reported that passing and receiving, (i.e.both NAR behaviors) did not require as much concentration as other skills such as entering the ball from the wing position or taking a shot. A decrease in the GSR2 tone as she was rehearsing these situations indicated a decrease in tension levels. While these skills were perceived as being easy by the athlete, results suggested for almost all subjects that these situations were difficult(i.e. performance was generally rated as 'wrong' by the judges). These results suggest the importance of comprehensive treatment procedures which will overcome the effects of subjective biases of subjects in relation to various skills. One other factor may have contributed to the minimal effects of treatments. It is possible that too many situations were intervened upon, causing the athlete to become overloaded and lose her attention in some situations.

In summary, the results of this study suggest some encouragement for the use of relaxation and mental rehearsal strategies to enhance performance. Results suggest that an athlete's TAIS profile can be an important assessment tool in predicting the direction of emphasis necessary for specific attentional behaviors during mental rehearsal sessions. The TAIS results of this study however, were only partial and suggest the necessity of further validity testing on the target behaviors of Nideffer's TAIS. Introspective reports of the athletes suggested that mental

rehearsal was helping them, which may be one very important step in improving performance. Treatment effects were very minimal in this study. Such results may well question the appropriateness of the situations chosen for analysis. The validity or the strength of the treatment package used in this investigation may be suspect.

Although the positive intervention effects attained from this study would appear to be limited, the use of a single subject time series design may shed a positive light on the findings. Kratochwill(1978)compares single subject design data results with results attained from other statistical designs. He concluded:

> In order to produce a visible change in the data, an effect would probably have to be more powerful than that required to produce a statistically significant change . . . As a result, the basic and fundamental variables of behavior are those possessing sufficient power and generality to be seen through graphic analysis . . .

The results of this study certainly encourage further use and critical evaluation of Nideffer's(1976a) 'Attention Control Training' program in sport performance.

V. Summary, Conclusions and Recommendations

Summary

The main purpose of this study was to investigate the efficacy of employing Nideffer's(1976a) 'Attention Control Training' program, using relaxation combined with mental rehearsal as part of a basketball training program. To measure the effects of these two cognitive coping strategies, six game situations were selected as representing either a broad external(BET) or narrow(NAR) focus of attention. Four University of Alberta female intervarsity basketball players were chosen as subjects for the investigation. Each subject participated in private sessions to learn centering, a relaxation technique,and to mentally rehearse specific basketball situations. Sessions were continued prior to each home game until all of the six situations were intervened upon.

A time series design across behaviors and across idividuals was employed to measure each player's game performance in these six situations. Conclusions were then made regarding the effects of relaxation and mental rehearsal on the athlete's performance. The data results were plotted on graphs which represented each subject in all six situations. A visual analysis was completed, observing changes from baseline performance to post intervention performance.

The first hypothesis that intervention would enhance performance, was rejected. The graph analysis revealed some

positive findings, however these results could not be replicated across subjects or behaviors.

The second hypothesis that a positive relationship would exist between a player's initial TAIS profile and the intervention effects on the BET and NAR behaviors, was not rejected but was not able to be confirmed. The TAIS profile of each subject proved to provide some congruency with the results of both positive and negative intervention effects. While subjects did differ in attentional strengths they did not differ in weaknesses making analysis of the correspondence between treatment effects and TAIS profiles weak. Added to this was the lack of strong treatment effects on any of the behaviors. The usefulness of the TAIS in predicting attentional strengths and weaknesses requires further research, but may have some positive practical implications.

Conclusions

Hypothesis 1 which stated that the cognitive strategies of centering and mental rehearsal would enhance performance was rejected. Positive intervention effects were found on the following:

Subject 1

Ball entered from point position

Pressure passing in backcourt

Subject 2

Ball entered from point position

Subject 3

Ball entered from point position

Ball entered from wing position

Subject 4

Ball entered from wing position

Due to the low frequency measures, no intervention effects were measured on the following:

Subject 1

Drive

Receiving pass

Subject 2

Drive

Receiving pass

Subject 3

Player position on the press

Drive

Pressure passing in backcourt

Receiving pass

Subject 4

Pressure passing in backcourt

Drive

Receiving pass

No intervention effects were found on the following:

Subject 1

Ball entered from wing position

Player position on the press

Subject 2

Ball entered from wing position

Player position on the press

Pressure passing in backcourt

Subject 4

Ball entered from point position

Player position on the press

Hypothesis 2 which suggested that a positive relationship would exist between a player's initial TAIS profile and the intervention effects on the BET and NAR behaviors was not rejected or accepted based on the following results:

1. Subject one was assessed as having a good ability to narrow her attention. The one NAR situation (i.e. pressure passing in backcourt) in which there was a high enough occurance of the behavior to measure performance, indicated positive intervention effects. Subject one's BET score was average and she also attained limited positive results in these situations.

2. Subject two achieved a high BET score on the TAIS. Her data results in one BET situation on the court yielded positive intervention effects. Subject two had an average NAR score but did not attain positive results in any NAR situations.

3. Subjects whose TAIS results indicated average attentional abilities, displayed both positive and negative results. The

ideal basketball attentional profile requires high BET and NAR scores on the TAIS and hence these results are acceptable.

Recommendations

The following recommendations for the use of the strategies of centering combined with mental rehearsal are made based upon the results of this investigation:

1. Prior to intervention a minimum number of training sessions should be conducted to ensure the subjects have the skills necessary to benefit from centering and mental rehearsal. At this time a self-report visualization test should be completed to determine the athletes' ability to develop an image. Throughout sessions this self-report test for visualization should be repeated, to ensure the athletes are actually visualizing the specified game situations.
2. Athletes chosen to participate in relaxation and mental rehearsal must be self-motivated individuals who are prepared to work hard during the intervention sessions. It is recommended that experienced players be chosen as subjects if the goal is to enhance their performance. Mental rehearsal is recommended to be used to aid novice players in skill acquisition and hence achieve some consistency in performance.
3. It is recommended that a biofeedback instrument such as the GSR2 be used as a tool to aid the players recognize

stressful situations and learn to relax. This immediate feedback can provide motivation and sustain the players' interest throughout mental rehearsal sessions.

4. Relaxation should be used prior to mental rehearsal to allow the athletes to redirect attention towards the rehearsal of specific game situations.

5. Mental rehearsal procedures should begin with the athlete visualizing the whole skill followed by visualization of the component parts. This procedure should then culminate in a visualization of the whole picture.

6. Each relaxation and mental rehearsal session should be of a short duration (eg. MP literature suggests no longer than 10 mins.), to ensure that attention is sustained throughout all rehearsal situations. Sessions should be organized daily and the athletes should rehearse the same situations visualized during the daily session immediately prior to the evening physical practice session.

7. The content of a mental rehearsal situation should be verbalized by the subject while they are visualizing it. The investigator can make corrections at this time, ensuring the athletes are rehearsing the proper execution of the skill.

8. A video-tape recording of each player in a game situation can be used to provide examples of correct and incorrect skill execution. This feedback will help develop a picture of the whole skill for each player to use during mental rehearsal.

9. In conjunction with the game checklists for mental

rehearsal, the athletes should keep a log recording the time and content of their mental practice sessions and their subjective feelings towards it.

10. Only one or two game situations should be rehearsed each week prior to games in order to prevent the athletes from becoming overloaded with information.

The results of this study indicate that <u>further research</u> is necessary in the following areas:

1. Instrument development and validation: a refinement of the instrument used for measuring the BET and NAR behaviors in this study is necessary for further more specific evaluation of the effects of the centering and mental rehearsal strategies. The specific situations chosen representing these behaviors may require further specification, or in fact, may not have been representative of the attentional behaviors at all.

2. Intervention procedures: studies comparing different frequencies and durations of sessions is necessary to determine the most appropriate schedules of mental rehearsal. Studies comparing both novice and experienced groups are also needed to determine individual differences and intervention effects. The content of visualizing and the method the athlete uses to attain these images needs further investigation. It is also necessary to determine the longevity of effects of relaxation and mental rehearsal strategies.

3. Construct validity of Nideffer's model of attention: one

basic assumption of this investigation relates to the construct validity of Nideffer's description of attention. Nideffer(1976a) assumes that an individual has an attentional style based on either a : broad external focus of attention, a narrow focus of attention a broad-internal focus of attention or any combination of each. Further research is necessary to determine if indeed this is true(i.e. are there three and only three attentional behaviors and do Nideffer's structures adequately describe them?). The validity of this construct will have implications for the content of TAIS, that is, the content of the TAIS should be congruent with the hypothetical construct of attention.

In addition to the above recommendations, the following suggestions are directed towards the coach attempting to implement such a program:

1. Begin by having the athletes write the TAIS. This attentional assessment will identify problem athletes who could benefit from 'Attention Control Training'.
2. Initial training sessions should be conducted with all the athletes to teach the relaxation and mental rehearsal strategies.
3. At the beginning of each week each athlete should meet privately with the coach for ten to fifteen minutes so that the coach can introduce two situations to be rehearsed throughout the week. The coach should have the athlete verbalize these situations and make corrections if

necessary. At this time a video-tape recording of a game should be available in order to point out the correct and incorrect methods of execution and, if possible, be at the disposal of the athlete throughout the week.

4. A checklist and/or tape recording of these skills should be available for the athlete to mentally rehearse on her own for the remainder of the week.

5. After the weekend games the coach should meet with each individual athlete and analyze the video-tape recording of those specific game situations.

6. A GSR2, or any other biofeedback instrument, should be made available for the athletes to use for relaxation training.

7. A log book should be kept by the athletes, recording all relaxation and mental rehearsal sessions. It is important that each athlete note any problems she had relaxing and rehearsing and note the strategies that best helped her in attaining clear and vivid images. These should then be fed back to the coach on a weekly basis.

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VII. Appendices

TAIS Attentional Scales

BET - (Broad External focus) High scores on this scale are obtained by the individuals who describe themselves as being able to effectively ittegrate many external stimuli at one time.

OET - (Overloaded Externally) The higher the score, the more individuals make mistakes because they become confused and overloaded with external stimuli.

BIT - (Broad Internal focus) High scores indicate that individuals see themselves as able to effectively integrate ideas and information from several different areas. They see themselves as analytical and philosophical.

OIT - (Overloaded Internally) The higher the score, the more mistakes individuals make because they confuse themselves by thinking about too many things at once.

NAR - (Narrow Attentional focus) The higher the score, the more effective individuals see themselves with respect to being able to narrow their attention when they need to.

RED - (Reduced Attentional focus) A high score on this scale indicates that the individuals make mistakes because they narrow their attention too much.

Characteristics of Subjects

SUBJECT	PANDA EXPERIENCE	BET SCORE & DESCRIPTION	NAR SCORE & DESCRIPTION
1	Year 3	Average - can effectively integrate an average amount of information	High - good ability to narrow attention
2	Year 2	High - able to effectively integrate alot of information	Average - average ability to narrow attention
3	Year 1	Average - can effectively integrate an average mount of information	Average - average ability to narrow attention
4	Year 1	Average - can effectively integrate an average amount of information	Average - average ability to narrow attention

Data Recording Sheet

GAME VS _____ DATE: _____ SUBJECT: _____

POINT-BALL ENTRY			WING-BALL ENTRY			PRESS(Z) MAN(M)		
BEST	OKAY	WRONG	BEST	OKAY	WRONG	BEST	OKAY	WRONG

DRIVE			PASSING			RECEIVING		
BEST	OKAY	WRONG	BEST	OKAY	WRONG	BEST	OKAY	WRONG

Behavior Frequency Chart

FREQUENCY OF OCCURANCE OF BET AND NAR BEHAVIORS IN EACH SITUATION

	GAME	1	2	3	4	5	6	7	8	9	10	11	12
BALL ENTERED FROM POINT POSITION	S_1	14	18	9	22	22	23	26	20	22	33	25	21
	S_2	8	14	9	15	17		14	17	18	17	7	15
	S_3	3	6	13	9	3	5	7	0	7	9	10	4
	S_4	3	2	6	5	10		8	2	10	5	9	8
BALL ENTERED FROM WING POSITION	S_1	21	24	21	26	29	22	21	20	17	19	20	25
	S_2	19	16	13	20	22		29	9	26	15	13	19
	S_3	6	1	5	13	10	14	10	5	8	11	8	2
	S_4	5	5	15	4	8		25	15	8	9	9	12
PLAYER POSITION ON THE PRESS	S_1	4	2	12	10	12	0	2	22	14	12	10	6
	S_2	2	0	9	8	12		4	5	8	15	9	8
	S_3												
	S_4	1	0	5	2	7		7	6	4	3	9	12
DRIVE	S_1												
	S_2												
	S_3												
	S_4												
PRESSURE PASSING IN BACK-COURT	S_1	11	6	4	2	1	5	7	6	9	8	9	18
	S_2	7	2	3	5	5		7	2	7	4	6	7
	S_3												
	S_4												
RECEIVING A PASS													